REGISTER

OF

THE LEHIGH UNIVERSITY,

1885-1886.

TUITION FREE.

SOUTH BETHLEHEM, PA.:
1886.

REGISTER

OF

THE LEHIGH UNIVERSITY,

SOUTH BETHLEHEM, PA.

1885-1886.

FOUNDED BY ASA PACKER.

TUITION FREE.

BETHLEHEM, PA.
EDWIN G. KLOSE, MANAGER.
1886.

TABULAR ALMANAC.

1885.

JULY.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	...
...	...	...	...	...	...	...

AUGUST.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...

SEPTEMBER.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	...	...	...
...	...	...	...	...	...	...

OCTOBER.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
...	...	...	...	...	...	...

NOVEMBER.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	...	...	...	...	...
...	...	...	...	...	...	...

DECEMBER.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...
...	...	...	...	...	...	...

1886.

JANUARY.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	...	...	...	...	...	...

FEBRUARY.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	...	...	...	...	...	...
...	...	...	...	...	...	...

MARCH.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	...	...	...
...	...	...	...	...	...	...

APRIL.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	...
...	...	...	...	...	...	...

MAY.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...

JUNE.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	...	...	...
...	...	...	...	...	...	...

JULY.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
...	...	...	...	...	...	...

AUGUST.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	...	...	...	...
...	...	...	...	...	...	...

SEPTEMBER.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	...	...
...	...	...	...	...	...	...

OCTOBER.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	...	...	...	...	...	...

NOVEMBER.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	...	...	...	...
...	...	...	...	...	...	...

DECEMBER.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	...
...	...	...	...	...	...	...

1887.

JANUARY.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...

FEBRUARY.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	...	...	...	...	...
...	...	...	...	...	...	...

MARCH.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...
...	...	...	...	...	...	...

APRIL.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
...	...	...	...	...	...	...

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	...	...	...	...
...	...	...	...	...	...	...

JUNE.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	...	...
...	...	...	...	...	...	...

CALENDAR.

1885-1886.

1885.		
Sept. 14–16,	Monday, Tuesday and Wednesday,	Examinations for Admission.
Sept. 16,	Wednesday,	First Term begins.
Oct. 8,	Thursday,	Founder's Day.
Nov. 26,	Thursday,	Thanksgiving Day.
Dec. 23,	Wednesday,	First Term ends.
1886.		
Jan. 12–13,	Tuesday and Wednesday,	Examinations for Admission.
Jan. 13,	Wednesday,	Second Term begins.
Jan. 23,	Saturday,	Junior Prize Orations due.
Feb. 22,	Monday,	Washington's Birthday.
March 10,	Wednesday,	Ash Wednesday.
April 22,	Thursday,	Easter Holidays begin.
April 27,	Tuesday,	Easter Holidays end at 8¼ A.M.
May 31,	Monday,	University-Day Orations due.
June 2,	Wednesday,	Theses of Seniors due.
June 2,	Wednesday,	Senior Examinations begin.
June 7,	Monday,	Annual Examinations begin.
June 12,	Saturday,	Senior Examinations end.
June 18,19,21,	Friday, Saturday and Monday,	Examinations for Admission.
June 20,	Sunday,	Baccalaureate Sermon.
June 22,	Tuesday,	Class Day.
June 23,	Wednesday,	Alumni Day.
June 24,	Thursday,	University Day.

1886-1887.

1886.		
Sept. 13–15,	Monday, Tuesday and Wednesday,	Examinations for Admission.
Sept. 15,	Wednesday,	First Term begins.
Oct. 8,	Thursday,	Founder's Day.
Nov. 25,	Thursday,	Thanksgiving Day.
Dec. 22,	Wednesday,	First Term ends.
1887.		
Jan. 11–12,	Tuesday and Wednesday,	Examinations for Admission.
Jan. 12,	Wednesday,	Second Term begins.
June 23,	Thursday,	University Day.

BOARD OF TRUSTEES.

THE RIGHT REV. M. A. DEWOLFE HOWE, D.D., LL.D.,	Reading.
ROBERT H. SAYRE, ESQ.,	South Bethlehem.
WILLIAM H. SAYRE, ESQ.,	South Bethlehem.
JOHN FRITZ, ESQ.,	Bethlehem.
HON. ECKLEY B. COXE,	Drifton.
ELISHA P. WILBUR, ESQ.,	South Bethlehem.
JAMES I. BLAKSLEE, ESQ.,	Mauch Chunk.
H. STANLEY GOODWIN, ESQ.,	South Bethlehem.
CHARLES HARTSHORNE, ESQ.,	Philadelphia.
CHARLES H. CUMMINGS, ESQ.,	Mauch Chunk.

HONORARY TRUSTEES.

THE RIGHT REV. W. B. STEVENS, D.D., LL.D.,	Philadelphia.
THE RIGHT REV. CORTLANDT WHITEHEAD, D.D.,	Pittsburgh.
CHARLES BRODHEAD, ESQ.,	Bethlehem.
HARRY INGERSOLL, ESQ.,	Philadelphia.
GEORGE W. CHILDS, ESQ.,	Philadelphia.
THE REV. LEIGHTON COLEMAN, S.T.D.,	Oxford, England.
FRANKLIN B. GOWEN, ESQ.,	Philadelphia.
W. L. CONYNGHAM, ESQ.,	Wilkes-Barre.
CHARLES O. SKEER, ESQ.,	Mauch Chunk.
MICHAEL SCHALL, ESQ.,	York.
THE REV. MARCUS A. TOLMAN.	Mauch Chunk.
HON. ROBERT KLOTZ,	Mauch Chunk.
HON. HENRY GREEN,	Easton.

HONORARY ALUMNI TRUSTEES.

	TERM EXPIRES.	
C. L. Taylor, E.M., Class of 1876,	1886,	Pittsburgh.
Wm. R. Butler, M.E., Class of 1870,	1887,	Mauch Chunk.
H. F. J. Porter, M.E., Class of 1878,	1888,	New York City.
J. S. Cunningham. M.E.. Class of 1879,	1889.	Everett.

OFFICERS OF THE BOARD.

President,
The Right Rev. M. A. DeWolfe Howe, D.D., LL.D.
Secretary,
Elisha P. Wilbur, Esq.
Treasurer of the University,
H. Stanley Goodwin, Esq.

EXECUTIVE COMMITTEE.

Robert H. Sayre, Esq., *Chairman,*
Elisha P. Wilbur, Esq.,
John Fritz, Esq.,
James I. Blakslee, Esq.,
H. Stanley Goodwin, Esq.
R. Morris Gummere, *Secretary.*

LIBRARY COMMITTTE.

The Director of the Library, *Chairman.*
The President of the Board of Trustees,
The President of the University,
Hon. Eckley B. Coxe, Elisha P. Wilbur, Esq.

BUILDING COMMITTEE.

Elisha P. Wilbur, Esq., *Chairman,*
Robert H. Sayre, Esq., H. Stanley Goodwin, Esq.

FACULTY.

ROBERT A. LAMBERTON, LL.D.,
President.

HENRY COPPÉE, LL.D.,
Professor of English Literature, International and Constitutional Law, and the Philosophy of History.

WILLIAM H. CHANDLER, PH.D., F.C.S.,
Professor of Chemistry.

BENJAMIN W. FRAZIER, M.A.,
Professor of Mineralogy and Metallurgy.

H. WILSON HARDING, M.A.,
Professor of Physics.

JAMES P. KIMBALL, PH.D, F.G.S.,
Professor of Economic Geology.

CHARLES L. DOOLITTLE, C.E.,
Professor of Mathematics and Astronomy.

WILLIAM A. LAMBERTON, M.A.,
Professor of the Greek Language and Literature

MANSFIELD MERRIMAN, C.E., PH.D.,
Professor of Civil Engineering.

SEVERIN RINGER, U.J.D.,
Professor of Modern Languages and Literatures, and of History.

HENRY C. JOHNSON, M.A., LL.B.,
Professor of the Latin Language and Literature, and Secretary of the Faculty.

THE REV. FREDERIC M. BIRD, M.A.,
Chaplain and Professor of Psychology, Christian Evidences and Rhetoric.

EDWARD H. WILLIAMS, JR., B.A., E.M., A.C.,
Professor of Mining Engineering and Geology.

JOSEPH F. KLEIN, D.E.,
Professor of Mechanical Engineering.

LECTURER.

WILLIAM L. ESTES, M.D.,
Lecturer on Physiology and Hygiene.

INSTRUCTORS.

SPENCER V. RICE, C.E.,
Instructor in Drawing.

ARTHUR E. MEAKER, C.E.,
Instructor in Mathematics.

ALBERT L. COLBY, Ph.B.,
Instructor in Quantitative Analysis.

JULIAN W. BAIRD, M.A., Ph.C.,
Instructor in Qualitative Analysis and Assaying.

HARVEY S. HOUSKEEPER, B.A.,
Instructor in Physics.

THOMAS M. EYNON, M.E.,
Instructor in Mechanical Engineering.

PRESTON A. LAMBERT, B.A.,
Instructor in Mathematics.

ENOS K. BACHMAN, E.M.,
Instructor in Mining and Metallurgy.

WILLIAM D. HOLMES, Ph.B ,
Instructor in Practical Photography.

WILLIAM K. GILLETT, M.A.,
Instructor in Modern Languages.

WALTER MOELLER, Ph.B.,
Instructor in Organic Chemistry.

FONGER DE HAAN, C.N.L.,
Instructor in Modern Languages.

O. JULIUS MARSTRAND, C.E.,
Instructor in Civil Engineering.

GYMNASIUM.

Director,
WILLIAM H. HERRICK, B.A.,

Assistant,
CHARLES F. SEELEY.

LIBRARY.

Director,
WILLIAM H. CHANDLER, PH.D.

Chief Cataloguer,
A. W. STERNER.

Entry Clerk,
GEORGE W. H. PERKIN.

STUDENTS.

Clas.—Classical Course.
L. S.—Latin-Scientific Course.
Sci.—Course in Science and Letters.
Tech.—Technical Course.
A. C.—Analytical Chemistry.
C. E.—Civil Engineering.
E. M.—Mining Engineering.
M. E.—Mechanical Engineering.
Met.—Metallurgy.
Ad. Elec.—Advanced Electricity.

The students whose names are printed in *italics* are not clear of conditions.

GRADUATES.

	For Degree.	Residence.
Walter Briggs, B.A.,	M.A.,	Scranton.
Harry Luther Bowman, B.M.,	E.M.,	Millersville.
Harry Augustus Butler, B.S.,	M.S.,	Mauch Chunk.
Hedley Vicars Cooke, B.A.,	M.A.,	Washington, D. C.
Robert Grier Cooke, B.A.,	M.A.,	Bethlehem.
Francis Joseph Crilly, B.A.,	M.A.,	Philadelphia.
William Banks Foote, B.M.,	E.M.,	Rochester, N. Y.
William Theodore Goodnow, C.E.,	M.S.,	Bethlehem.
Irving Andrew Heikes, B.M.,	E.M.,	Mechanicsburg.
John Daniel Hoffman, B.A.,	M.A.,	Bethlehem.
Garrett Linderman Hoppes, C.E.,	B.S.,	Bethlehem.
Preston Albert Lambert, B.A.,	M.A.	Bethlehem.
Paul Devereux Langdon, M.A.,	A.C.,	Augusta, Ga.
Wilson Franklin More, B.A.,	M.A.,	Lancaster.
George Spencer Patterson, E.M.,	M.S.,	Mahanoy City.
Francis Henry Purnell, C.E.,	E.M.,	Berlin, Md.
Lewis Buckley Semple, B.A.,	M.A.,	Reading.
Leonard Blakslee Treharn, B.A.,	M.A.,	Boston, Mass.
James Hollis Wells, C.E.,	M.S.,	Bethlehem.

SENIOR CLASS.

	COURSE.	RESIDENCE.
George Rodney Booth,	L.S.,	Bethlehem.
Richard Singmaster Breinig,	E.M.,	Breinigsville.
John Henry Brown,	C.E.	South Bethlehem.
Charles Ellsworth Clapp,	L.S.,	Warren, O.
George Henry Cobb,	M.E.,	Palmer, Mass.
William Henry Dean,	E.M.,	Clarence, Iowa.
Frederick William Fink,	C.E.,	Summit Hill.
Harry William Frauenthal,	A.C.,	Wilkes-Barre.
Robert Caldwell Gotwald,	C.E.,	Springfield, O.
Lewis John Henry Grossart,	C.E.,	Allentown.
Max Sigismund Hanauer,	A.C.,	Columbia.
Solomon Jacob Harwi,	C.E.,	Friedensville.
Simeon Cole Hazelton,	E.M.,	Washington, D. C.
Mark Antony deWolfe Howe, jr.,	Clas.,	Reading.
Charles Alexander Junken,	C.E.,	Washington, D. C.
Guadalupe López de Lara,	M.E.,	Guadalajara, Mexico.
Charles Augustus Luckenbach,	E.M.,	Bethlehem.
William Anthony Lydon,	E.M.,	Chicago, Ill.
Paul Douglass Millholland,	C.E.,	Reading.
Francis William Birchal Pile,	E.M.,	London, England.
Henry Gerber Reist,	M.E.,	Florin.
Joseph William Richards,	A.C.,	Philadelphia.
George Mann Richardson,	A.C.,	St. Louis, Mo.
Augustus Stoughton Ross,	M.E.,	Philadelphia.
George Arthur Ruddle,	L.S.,	East Mauch Chunk.
William Heysham Sayre, jr.,	M.E.,	South Bethlehem.

	COURSE.	RESIDENCE.
John Selmar Siebert,	C.E.,	Washington, D. C.
John Henry Spengler,	C.E.,	Bethlehem.
Edwin Stanton Stackhouse,	E.M.,	Shickshinny.
Edward Eckert Stetson,	A.C.,	Reading.
Theodore Stevens,	E.M.,	New York City.
Harry Eugene Stout,	E.M.,	Audenried.
Joseph Kiddoo Surls,	E.M.,	Beaver Falls.
William Patterson Taylor,	Clas.,	Philadelphia.
Harry Toulmin,	L.S.,	Bethlehem.
Priestley Toulmin,	E.M.,	Bethlehem.
Curtis Hussey Veeder,	M.E.,	Plattsburgh, N. Y.

JUNIOR CLASS.

	COURSE.	RESIDENCE.
Frank Fielding Amsden,	E.M.,	Scranton.
Robert Webb Barrell,	E.M.,	New Providence, N. J.
Francisco Alberto Bermudes,	C.E.,	Leon, Nicaraugua.
Alexander Bonnot,	C.E.,	Norfolk, Va.
Charles Austin Buck,	A.C.,	South Bethlehem.
Julian Carter Buckner,	M.E.,	Baltimore, Md.
Benjamin Amos Cunningham,	C.E.,	Frederick City, Md.
Eugene Diven,	M.E.,	Elmira, N. Y.
Alfred Doolittle,	Clas.,	Bethlehem.
Francis Rouad Dravo,	M.E.,	Allegheny.
Milton Henry Fehnel,	Sci.,	Bethlehem.
Harvey Sheafe Fisher,	Clas.,	Pottsville.
Kenneth Frazier,	Clas.,	Bethlehem.
Henry Stevens Haines, jr.,	M.E.,	Savannah, Ga.
John Benjamin Franklin Hittell,	C.E.,	Allentown.
John Myers Howard,	M.E.,	Hagerstown, Md.
Charles Colcock Jones,	E.M.,	New Orleans, La.

	Course.	Residence.
William Frederick Kiesel, jr.,	M.E.,	Scranton.
John Walter LaDoo,	C.E.,	Houghton, Mich.
Samuel Davis Langdon,	M.E.,	Augusta, Ga.
Garrett Brodhead Linderman, jr.,	Sci.,	South Bethlehem.
Charles William Lohse,	C.E.,	Wheeling, W. Va.
Walter Ashfield McFarland,	M.E.,	Milwaukee, Wis.
Harry Smuller Meily,	M.E.,	Middletown.
William Wirt Mills,	L.S.,	Reading.
James Alexander Morrow,	C.E.,	Tyrone.
Henry Benjamin Charles Nitze,	E.M.,	Baltimore, Md.
George Francis Pettinos,	M.E.,	Carlisle.
Robert Henry Phillips,	C.E.,	Washington, D. C.
William Ross Pierce,	E.M.,	Franklin Furnace, N. J.
Rufus King Polk,	E.M.,	Columbia, Tenn.
Charles Pope Pollak,	C.E.,	St. Louis, Mo.
Mason Delano Pratt,	C.E.,	Carlisle.
Harleigh Agnew Reichard,	L.S.,	Easton.
George Thomas Richards,	C.E.,	Pittsburgh.
John Warwick Scull,	M.E.,	Philadelphia.
Frank Stuart Smith,	A.C.,	Wyoming.
Elmer Ellis Snyder,	C.E.,	Bethlehem.
Harry Harkness Stoek,	E.M.,	Washington, D. C.
Otway Owen Terrell,	M.E.,	Burton's Creek, Va.
Edward Power Van Kirk,	E.M.,	Elizabeth.
Robert Lee Whitehead,	A.C.,	Amherst, Va.
August Julius Wiechardt,	M.E.,	Philadelphia.
Henry August Julius Wilkens,	E.M.,	Baltimore, Md.
Frank Williams,	E.M.,	Johnstown.
Arthur Raymond Wilson,	Sci.,	Bethlehem.
Nissley Joseph Witmer,	C.E.,	Lebanon.
Wade Hampton Woods,	Sci.,	Philadelphia.

	Course.	Residence.
Walter Wyckoff,	E.M.,	Belvidere, N. J.
Harry Clay Yeatman, jr.,	A.C.,	Columbia, Tenn.
George Frederic Yost,	M.E.,	Bethlehem.
Charles Frederic Zimmele,	L.S.,	Bethlehem.

SOPHOMORE CLASS.

	Course.	Residence.
Charles Lambert Addison,	M.E.,	Reading.
Charles Lincoln Banks,	Sci.,	Bridgeport, Conn.
Edmund A. Bates,	C.E.,	Philadelphia.
Frederic Sturtevant Bates,	M.E.,	Titusville.
William Donaldson Beatty,	C.E.,	Pottsville.
Hubert Alexander Bonzano,	C.E.,	Phœnixville.
Adolph Theodore Bruegel,	M.E.,	Cherryville.
Otto Cornelius Burkhardt,	E.M.,	Bethlehem.
Charles Noble Butler,	C.E.,	Loag.
Morton Lewis Byers,	C.E.,	Pittsburgh.
Lincoln Calvin Carl,	C.E.,	Williamstown.
Leonardo Bravo y Castro,	E.M.,	Santiago de Cuba.
John Jesse Clark,	M.E.,	Corning, N. Y.
Charles Philip Coleman,	M.E ,	Baltimore, Md.
George Philip Connard,	C.E.,	Reading.
Justice Cox Cornelius,	C.E.,	Philadelphia.
Augustus Crawford, jr.,	A.C.,	Baltimore, Md.
Reuben Daniels,	C.E.,	Saxton's River, Vt.
George Herschel Davis,	C.E.,	Cavendish, Vt.
William Schaff Davis,	C.E.,	Reading.
Philip Hoffecker DeWitt,	C.E.,	Weatherly.
Manuel Victor Domenech,	C.E.,	Isabela, Porto Rico.
George Patterson Dravo,	M.E.,	Allegheny.
Ernest Hipolite Du Vivier,	A.C.,	New York City.

	Course.	Residence.
Charles Langley Flack,	E.M.,	Washington, D. C.
Charles Wesley Focht,	C.E.,	Pottsville.
George Steinman Franklin,	M.E.,	Lancaster.
Samuel Wilson Frescoln,	C.E.,	Reading.
Louis Mallet Prevost Gaston,	E.M.,	Somerville, N. J.
William Gates, jr.,	C.E.,	Kittanning.
Gustav Edward Gieske,	A.C.,	Catonsville, Md.
James Bolan Glover,	M.E.,	Marietta, Ga.
Hughlett Hardcastle,	M.E.,	Easton, Md.
George Augustus Hart,	M.E.,	South Bethlehem.
Herbert Thomas Hartman,	Sci.,	Fort Wayne, Ind.
John Howard Hartman,	M.E.,	Lancaster.
Robert Anderson Heberling,	L.S.,	Mauch Chunk.
Robert Browne Honeyman,	E.M.,	Bethlehem.
Sterry Henry Jencks,	C.E.,	Providence, R. I.
Thomas King,	E.M.,	Mooers, N. Y.
Frederick Hayes Knorr,	A.C.,	Philadelphia.
Ralph William Lee,	C.E.,	Catonsville, Md.
Alfred Kramer Leuckel,	L.S.,	Lehighton.
Alfred Eli Lewis, jr.,	E.M.,	Milford.
James Struthers Mack,	C.E.,	Mauch Chunk.
Charles Donnell Marshall,	C.E.,	Allegheny.
Howard Hale McClintic,	C.E.,	Lewistown.
Howard Leoser McIlvain,	A.C.,	Reading.
Charles Henry Miller,	C.E.,	Strasburg.
George Philips Miller,	C.E.,	Lewisburg.
John Hoff Millholland,	C. E.	Reading.
Edgar Bennett Mitchell,	M.E.,	Allentown.
Harlan Sherman Miner,	A.C.,	Chester, Vt.
William Ellis Morris,	E.M.,	Portland, Oregon.
Harry Semple Morrow,	M.E.,	White Ash.

	COURSE.	RESIDENCE.
Daniel Livermore Mott,	C.E.,	Sangerfield, N. Y.
William Lynville Neill,	L.S.,	Titusville.
Howard Seger Neiman,	A.C.,	Phœnixville.
John Hill Lamar Ogden,	M.E.,	Macon, Ga.
Joseph Michael O'Malley,	C.E.,	Wilkes-Barre
Albert Nickerson Palmer,	E.M.,	Baltimore, Md.
Harry Palmer,	C.E.,	Wilmington, Del.
Charles Jeremiah Parker,	C.E.,	Watertown, N. Y.
Robert Swain Perry,	A.C.,	Philadelphia.
Clarence Reynolds Phillips,	C.E.,	Harrisburg.
William Sidney Ramsey,	E.M.,	Danville.
Albert George Rau,	Sci.,	Bethlehem.
Clarence Elmer Raynor,	C.E.,	Manorville, N. Y.
Evan Turner Reisler,	C.E.,	Calvert, Md.
William Pemberton Richards,	C.E.,	Milford, Del.
Osmond Rickert,	C.E.,	Eckley.
William Richard Sattler,	M.E.,	Baltimore, Md.
George Brinkerhoff Shane,	C.E.,	Washington, D. C.
Eugene Hicks Shipman,	C.E.,	Clinton, N. J.
William Alonzo Stevenson,	M.E.,	Clark's Green.
Wyndham Harvey Stokes,	E.M.,	Gordonsville, Va.
Wilmer Marshall Webb,	M.E.,	Lancaster.
Harvey Musser Wetzel,	C.E.,	Bellefonte.
Charles McCombs Wilkins,	L.S.,	Warren, Ohio.
Winter Lincoln Wilson,	C.E.,	Elkton, Md.
Edward Benjamin Wiseman,	C.E.,	Elmira, N. Y.
Luther Reese Zollinger,	C.E.,	Harrisburg.

FRESHMAN CLASS.

	COURSE.	RESIDENCE.
Henry Altmier,	Tech.,	Harrisburg.
James Willoughby Anderson,	Tech.,	Norfolk, Va.
Herbert Ennis Arnold,	Tech.,	Aurora, Ill.
Pearce Atkinson,	Tech.,	Chicago, Ill.
George Reade Baldwin,	Tech.,	Elmira, N. Y.
Ralph Putnam Barnard,	Tech.,	Washington, D. C.
Samuel Erwin Berger,	Clas.,	Richland Centre.
Charles Hudson Boynton,	L.S.,	Washington, D. C.
Cyrus Emory Brown,	Tech.,	Johnstown.
Joseph Leander Budd,	Tech.,	Mount Holly, N. J.
Elmer Ellsworth Bush,	Tech.,	Bethlehem,
William Butterworth,	Tech.,	Cincinnati, Ohio
Edgar Campbell,	Clas.,	South Bethlehem.
Francis Joseph Carman,	Tech.,	Washington, D. C.
Herbert Mackenzie Carson,	Tech.,	Baltimore, Md.
David Castleman,	Tech.,	Louisville, Ky.
Abner Reeder Chambers, jr.,	Tech.,	Trenton, N. J.
Lansford Foster Chapman,	Tech.,	Catasauqua.
Holden William Chester,	Tech.,	Shamokin.
William Phelps Cleveland,	Tech.,	Waterville, N. Y.
Charles William Corbin,	Tech.,	Telluride, Colorado.
William Albert Cornelius,	Tech.,	Philadelphia.
Lawrence Cortes,	Tech.,	San Marcos, Cuba.
Thomas T. Cortes,	Tech.,	San Marcos, Cuba.
Myron Davis,	Tech.,	Milton.
Charles Herbert Deans,	Tech.,	Phœnixville.

	COURSE.	RESIDENCE.
Louis Loeser Dewees,	Sci.,	Pottsville.
Emil Diebistch,	Tech.,	Washington, D. C.
Charles Estell Dickerson, jr.,	Sci.,	New Germantown, N.J.
John Webster Dougherty,	Tech.,	Steelton.
Ralph Marshall Dravo,	Tech.,	Allegheny.
Albert Edward Duckham,	Tech.,	Pittsburgh.
Cornelius Dugan,	Tech.,	South Bethlehem.
Richard Coolidge Duncan,	Tech.,	Elyria, Ohio.
Delevan Emery,	Tech.,	Bradford.
Horace Haniferd Egbert,	Tech.,	Philadelphia.
Francis Hughes Farquhar,	L.S.,	Pottsville.
William Dolloway Farwell,	Clas.,	Oswego, N. Y.
Jacques DuGué Ferguson,	Tech.,	Greenville, Miss.
Roderick Prentiss Fisher,	Tech.,	New York City.
John Douglas Forster,	Tech.,	Harrisburg.
Arthur Hugh Frazier,	Clas.,	Bethlehem.
Edward Mayer French,	Tech.,	Bethlehem.
Frederick Louis Grammer,	Tech.,	Baltimore, Md.
Alfred Fletcher Grubb,	L.S.,	St. Louis, Mo.
John Wesley Hackney,	Tech.,	Smith's Landing, N. J.
George Wentz Harris,	Tech.,	Hazleton.
Lightner Henderson,	Tech.,	Gap.
Conrad Egbert Hesse,	Tech.,	Washington, D. C.
Adolph Hoehling,	Tech.,	Washington, D. C.
Wallis Eastburn Howe,	Clas.,	Reading.
Clarence Walter Hudson,	Tech.,	Manasquan, N. J.
John Milton Humphrey,	Tech.,	Philadelphia.
Emilio Hurtado,	Tech.,	Rivas, Nicaragua.
Charles Radcliffe Johnson,	Tech.,	Wilmington, Del.
Arch Johnston,	Tech.,	Bethlehem.
Robert Joseph Jones,	Tech.,	Lansford.

	Course.	Residence.
John Stower Kellogg, jr.	Tech.,	Atchinson, Kansas.
John Martin Sharpless Kerlin,	Tech.,	Elwyn.
Adolph Koones,	Tech.,	Washington, D. C.
Sylvanus Elmer Lambert,	Clas.,	Seidersville.
George Crist Landis,	Tech.,	Middletown.
John LeDroit Langdon,	Tech.,	Buffalo, N. Y.
John Lockett,	Tech.,	Bryan's Pen, Jamaica.
Thomas Smith Loeser,	Tech.,	New York City.
John Joseph Lincoln,	Tech.,	Farmington, Md.
Arthur Long,	Tech.,	Wilkes-Barre.
George Eber Manning,	Tech.,	Lebanon, Conn.
Joseph Howard Martz,	Tech.,	Allentown.
William David Matheson,	Tech.,	Brooklyn.
William Clark McLeod,	Tech.,	Rugby, England.
Charles Henry Miller,	Tech.,	Norristown.
Douglas Godfrey Miller,	Tech.,	New York City.
Charles Williams Moffett,	Tech.,	Newton, N. J.
Richard Henry Morris, jr.,	Tech.,	Bristol.
John Thomas Morrow,	Tech.,	Washington, D. C.
George Smuller Mish,	Tech.,	Middletown.
Thomas Franklin Newby,	Tech.,	Harrisburg.
Albert Daniel Oberly,	Tech.,	Easton.
William Bliem Ott,	Tech.,	Pleasant Valley.
Horace Phillips,	Tech.,	Philadelphia.
Robert Henry Eddy Porter,	Tech.,	Morristown, N. J.
Francis Edward Pratt,	Tech.,	New York City.
Francis Petrie Prindle,	Tech.,	Washington, D. C.
Frank R. Reynolds,	Tech.,	Marietta, Ga.
Frederick Pratt Reynolds,	Tech.,	Elmira, N. Y.
John Brown Robertson, jr.,	Tech.,	Amherst C. H., Va.
Abraham Lincoln Rogers,	Tech.,	Fort Wayne, Ind.

	COURSE.	RESIDENCE.
Chauncey Porter Rogers, jr.,	Tech.,	Corry.
Louis Augustus Round,	Tech.,	Providence, R. I.
Horace Hendel Sayre,	Tech.,	Philadelphia.
Charles William Schwartz, jr.,	Tech.,	Philadelphia.
Stewart Applegate Shimer,	Tech.,	Bethlehem.
Raymond Walton Smith,	Tech.,	Trenton, N. J.
Arthur Moult Smyth,	Tech.,	Philadelphia.
William Alston Stevenson,	Tech.,	Lewistown.
James Stewart, jr.,	Tech.,	Lancaster.
Alfred Walton Stockett,	Tech.,	Mauch Chunk.
Alvin Jay Tanner,	Tech.,	Cannonsville, N. Y.
Lester Clark Taylor,	Tech.,	Pawtucket, R. I.
Joel Elmer Tencate,	Tech.,	Phœnixville.
Frank Frazer Thomson,	Tech.,	Carlisle.
Augustus Thompson Throop,	Tech.,	Port Gibson, N. Y.
John Lambden Van de Water,	Tech.,	Baltimore, Md.
Atherton Blight Wadleigh,	Tech.,	South Bethlehem.
Clarence Walker,	Tech.,	Pottsville.
Philip Sidney Webb,	Tech.,	Bethlehem.
William Alder Webb.,	Sci.,	Bethlehem.
Harry Wilbur,	Tech.,	Bethlehem.
Harry Rush Woodall,	Tech.,	Philadelphia.
Walter Earl Weimer,	Tech.,	Lebanon.
David Thomas Williams,	Tech.,	Catasauqua.
Archibald Wright,	Tech.,	Philadelphia.
Edward Austin Wright,	Tech.,	Northampton, Mass.
Joseph Bodine Wright,	Tech.,	South Easton.

STUDENTS IN ADVANCED ELECTRICITY.

	Course.	Residence.
Edward Conner,	Ad. Elec.,	Philadelphia.
James Arthur Heaton,	Ad. Elec.,	Philadelphia.
Walter Eugene Hyer,	Ad. Elec.,	White House, N. J.
William Hoopes,	Ad. Elec.,	West Chester.
Robert McAllister Loyd,	Ad. Elec.,	Philadelphia.
George Harrison Neilson,	Ad. Elec.,	Bethlehem.
Louis Mortimer Sawyer,	Ad. Elec.,	New York City.
Russel Spaulding,	Ad. Elec.,	Paris, France.

SPECIAL STUDENTS.

	Course.	Residence.
Charles Belmont Davis,	A.C.,	Philadelphia.
George Hermann Koehler,	M.E.,	Hunter's Point, N. Y.
Charles Jacob Meade,	M.E.,	Hyde Park, N. Y.
Samuel Eaton Packard,	Clas.,	Portland, Me.
Walter Rollin Rathbun,	Sci.,	South Bethlehem.
John Bernard Simon, jr.,	E.M.,	Harrisburg.
Lewis Buckley Stillwell,	M.E.,	Scranton.
Theodore Adams Uehling,	A.C.,	Richwood, Wis.

SUMMARY OF STUDENTS BY CLASSES.

Graduates,	19
Seniors,	37
Juniors,	52
Sophomores,	82
Freshmen,	115
Students in Advanced Electricity	8
Specials,	8
Total,	321

SUMMARY OF STUDENTS BY STATES.

Maine,	1
Vermont,	3
Massachusetts,	3
Connecticut,	2
Rhode Island,	3
New York,	25
Pennsylvania,	182
New Jersey,	14
Delaware,	3
Maryland,	19
District of Columbia,	17
Virginia,	6
West Virginia,	1
Georgia,	6
Mississippi,	1
Louisiana,	1
Ohio,	5
Indiana,	2
Illinois,	3
Michigan,	1
Wisconsin,	2
Iowa,	1
Missouri,	3

Kentucky,	1
Tennessee,	2
Kansas,	1
Colorado,	1
Oregon,	1
Mexico,	1
Nicaraugua,	2
Porto Rico,	1
Cuba,	3
Jamaica,	1
England,	2
France,	1
Total,	321

SUMMARY OF STUDENTS BY COURSES.

SCHOOL OF GENERAL LITERATURE.		
Classical Course,	21	
Latin-Scientific Course,	14	
Course in Science and Letters,	15	
		50
SCHOOL OF TECHNOLOGY.		
Course in Civil Engineering,	100	
Course in Mining Engineering,	68	
Course in Mechanical Engineering,	67	
Course in Analytical Chemistry,	28	
Course in Electrical Engineering,	8	
		271
Total,		321

THE LEHIGH UNIVERSITY.

ORIGIN.

The Hon. Asa Packer of Mauch Chunk, during the year 1865, appropriated the sum of Five Hundred Thousand Dollars, to which he added one hundred and fifteen acres of land in South Bethlehem, to establish an educational Institution in the rich and beautiful Valley of the Lehigh. From this foundation rose The Lehigh University, incorporated by the Legislature of Pennsylvania in 1866. In addition to these gifts, made during his life-time, Judge Packer by his last will secured to the University an endowment of $1,500,000, and to the University Library one of $500,000.

DESIGN.

The original object of Judge Packer was to afford the young men of the Lehigh Valley a complete technical education for those professions which had developed the peculiar resources of the surrounding region. Instruction was to be liberally provided in Civil, Mechanical and Mining Engineering, Chemistry, Metallurgy, and in all needful collateral studies. French and German were made important elements in the collegiate course. A School of General Literature was part of the original plan, together with tuition in the ancient Classics.

FREE TUITION.

All these educational facilities are provided without charge. Through the generosity of the Founder, the Trustees were enabled, in 1871, to declare tuition free in all branches and classes. The Lehigh University is open to young men of good character and suitable preparation from every part of our own land and of the world. To this fact the attention of the pupils of our public schools and of the graduates of classical institutions is especially called. Thus is offered, *without charge*, every facility for studying the professions of the Civil, Mechanical and Mining Engineer, and of the Metallurgist and Analytical Chemist. In the Classical and Scientific departments of the School of General Literature instruction is given in the Classics, Sciences and Letters.

PUBLIC WORSHIP.

Prayers are held in the Chapel every morning and all students are required to be present.

Divine Service is held on every Sunday morning in the Chapel of the University. The service is according to the forms of the Protestant Episcopal Church, under whose auspices the University was placed by its Founder. Attendance is required of every student, except in case of those connected with other religious bodies, to whom the President will grant permission at the beginning of each term (if requested by the parent or guardian, or by the student himself if he be 21 years of age) to attend during that term the place of worship of the body with which he is connected, where attendance on Sunday morning will be required.

SITE.

The situation of the Institution is healthful and beautiful. The region is famous for its railway and manufacturing enterprises; it possesses some of the richest iron and coal mines in our land, and thus gives the students rare facilities for confirming the teachings of the recitation room by the observation of the eye.

The University Buildings are about a half-mile from the depot, at the junction of the Lehigh Valley and North Pennsylvania Railroads. New York is ninety-two, and Philadelphia fifty-four miles distant.

BUILDINGS.

PACKER HALL,

named after the Founder, stands seven hundred feet back of Packer Avenue, at the base of the South Mountain. It is built of stone, and contains the Chapel, Lecture and Recitation Rooms, the Drawing Room and the Cabinets.

THE UNIVERSITY LIBRARY.

To the east of Packer Hall is the University Library, erected by the Founder in memory of Mrs. Lucy Packer Linderman, his daughter.

THE GYMNASIUM

is a handsome and spacious structure, built and equipped with the utmost thoroughness. It is furnished with the best patterns of gymnastic apparatus, besides Dr. Sargent's system of Developing Appliances. It is provided with hot and cold water; tub, sponge and shower baths, and 306 clothes closets. Opportunities for recreation and amusement are provided in the billiard room and bowling alleys. It is under the immediate care of a skilled and competent Director.

All students are required to undergo a physical examination before being allowed the use of the Gymnasium, and this examination will be repeated once each year during their stay at the University. The proper exercise is prescribed and is required of every student. The aim of the Institution is to promote a harmonious symmetrical development best suited to the individual condition of the student.

THE SAYRE OBSERVATORY.

Near Brodhead Avenue is the Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, containing an equatorial and a zenith telescope, transit instrument and astronomical clock.

THE NEW LABORATORIES

were opened for use September 1st, 1884.

The building, which is thoroughly fire-proof, is built of sandstone, and is 219 feet in length by 44 in width, with a wing 95 feet by 50: the main building is devoted to the Department of Chemistry, and the wing to the Department of Mineralogy and Metallurgy.

There are two principal stories and a basement. The upper floor of the main building is occupied by the quantitative and the qualitative chemical laboratories, the former accommodating 48 and the latter 84 students. These rooms are 20 feet in height, and are well lighted and ventilated. A laboratory for industrial chemistry and the supply room are also on this floor.

The first floor contains a large lecture room, a recitation room, a chemical museum and laboratories for organic, physiological, agricultural and sanitary Chemistry.

In the basement is the large laboratory for the furnace assay of ores and a well appointed laboratory for gas analysis, also rooms containing the apparatus for several processes in industrial chemistry, the engine and air-pump for vacuum filtration, a store room and the toilet.

A photographic laboratory is located in the third story of the central portion of the main building.

The metallurgical wing contains a lecture room, a blowpipe laboratory for class instruction in blowpipe analysis and in the practical determination of crystals and minerals, a museum for mineralogical and metallurgical collections, a mineralogical laboratory provided with a Friess reflecting goniometer, a polariscope, a Groth's "universal apparat" and a Rosenbusch polarizing microscope, a dry laboratory provided with furnaces for solid fuel and for gas with natural draught and with blast, and a wet laboratory for ordinary analytical work. It is arranged for the instruction of classes in the courses of mineralogy, metallurgy and blowpipe analysis of the regular curriculum, and to afford facilities to a limited number of advanced students to familiarize themselves with the methods of measurement and research employed in mineralogy and metallurgy, and to conduct original investigations in these departments of science.

Great consideration has been devoted to the ventilation, lighting and heating of the entire building and its equipment with the best apparatus. In completeness and convenience it is unsurpassed by any similar establishment in the country.

OTHER BUILDINGS.

To the west, within the grounds, are the houses of the President and Professors, comporting in architecture with Packer Hall. Fronting on Packer Avenue stand Christmas Hall and Saucon Hall, commodious brick edifices, heated by steam and lighted by gas, containing students' rooms and a mess hall.

EXPENSES.

Tuition is FREE in all branches and classes. Books, materials, paper, pencils, chemical materials used in the analytical laboratory and drawing instruments, are furnished by the student.

Rooms and Board can be had in University buildings, under the following rules:

1. The room-rent, for each term, must be paid in advance to the Treasurer of the University. The price for board must also be paid monthly in advance.

2. The charge for board and room-rent shall be $5 per week. Where two students occupy a room jointly, the charge shall be $4.50 per week for each.

The charge for board shall be $4 per week. The charge for room without board shall be $2 per week for each room.

These prices include heat and a moderate consumption of gas.

3 The choice of rooms shall be in the order of the classes; in any class the first applicant to have the first choice.

4. Students may retain their rooms from year to year by giving notice of their intention so to do at the close of the academic year, and by procuring their tickets therefor on or before the first day of the next term.

5. Students are required to keep their rooms in order, or to employ some proper person to do so for them and to pay for any damage done them.

6. No furniture for rooms will be provided by the University.

7. The use of kerosene, coal oil or burning fluid, in any of the buildings, is prohibited.

The following is an estimate of the necessary expenses for the collegiate year, clothing and traveling not included:

Board for 40 weeks,	from $160	to	$200
Room-rent, with fuel and lights,	40	“	80
Care of room and use of furniture,	5	“	20
Washing and incidentals,	20	“	40
Books, stationery, etc.,	25	“	50
Total,	$250	to	$390

NOTE.—If clubs be formed the cost of board need not exceed $3.50 per week.

ADMISSION OF STUDENTS.

ENTRANCE EXAMINATIONS.

Application for admission should be made to the President of the University, from whom all information may be obtained.

DATE OF EXAMINATIONS.

Examinations for admission to the University are held at the opening of each term, and also in June at the close of the Academic year.

The examinations for 1886 will be on Tuesday and Wednesday, January 11 and 12, for admission to the second term; on Friday, Saturday and Monday, June 18, 19, and 21, and on Monday, Tuesday and Wednesday, September 13, 14 and 15, for admission to the first term. No other examinations for entrance will be held, except for good cause, and all applicants *must* be in attendance at 8.30 on the morning of the first day.

The examinations are held in the following order:

First Day.—English Grammar, 9.00 A.M.; Geography, 11.30 A.M.; United States History, 2 P.M.; Physical Geography, 4 P.M.

Second Day.—Geometry, 9 A.M.; Arithmetic, 2 P.M.; Algebra, 3.30 P.M.

Third Day.—Latin and Roman History; Elementary Physics, 8.30 A.M.; Greek and Greek History; Advanced Course in Electricity, 2 P.M.

CHARACTER OF THE EXAMINATIONS.

The examinations are rigorous and cover the entire ground laid down in the following scheme. They are all conducted in *writing*, supplemented by an oral examination at the option of the examiner.

All candidates for admission must be at least sixteen years of age, must present testimonials of good moral character, and, *must satisfactorily pass in the following subjects:*

1. *English Grammar*, including composition, spelling and punctuation. It is recommended that candidates have a knowledge of Latin Grammar, although an examination in it is not required for any courses except the Classical and the Latin-Scientific.

2. *Geography,* general and political.

3. *History of the United States,* including the *Constitution.*

4. *Arithmetic,* including the metric system of weights and measures.

5. *Algebra,* Fundamental Principles. Factoring. Least Common Multiple. Greatest Common Divisor. Fractions. Involution. Evolution. Radicals. Imaginary Quantities. Equations of the First and Second Degrees. Ratio. Proportion and Progressions.

[Olney's University Algebra is recommended, as it is the text-book used in the University.]

6. *Geometry,* Fundamental Principles. Rectilinear Figures. The Circle. Proportional Lines and Similar Figures. Comparison and Measurement of the Surfaces of Rectilinear Figures. Regular Polygons. Measurement of the Circle. Maxima and Minima of Plane Figures. The Plane and Polyhedral Angles.

[Chauvenet's Geometry, (six books) is recommended, as it is the text-book used in the University.]

For admission to the various courses, (except that in Advanced Electricity) *in addition* to the requirements above given, the examinations are as follows:

For the Course in Science and Letters, Civil, Mechanical and Mining Engineering, and Analytical Chemistry.

7. *Elementary Physics.*

[Balfour Stewart, Avery or Gage are recommended.]

For the Latin-Scientific and Classical Courses.

7. *Physical Geography.*

8. *Latin Grammar,* (Harkness' preferred).

9. *Cæsar,* four books of the Gallic war.

10. *Cicero,* six orations, including the four against Catiline.

11. *Virgil,* the Bucolics and the first six books of the Aeneid, including Prosody.

12. The translation, at sight, of passages from Cæsar and Cicero.

13. The translation of English into Latin. (As special importance is given this part of the examination, it is suggested to teachers that they connect exercises in making Latin, both oral and written, with all the studies of the preparatory course.)

14. *Roman History.* Creighton's Primer of Roman History is suggested as indicating the amount required.

For the Classical Course only.

15. *Greek Grammar*, (Goodwin's preferred).

16. *Xenophon,* Anabasis, four books.

17. *Homer*, Iliad, three books, including Prosody.

18. The translation, at sight, of a passage from some work of Xenophon.

19. *Greek History.* Fyffe's Primer of Greek History is suggested.

20. Writing Greek with accents.

The pronunciation of Greek according to the written accents is followed in the University, and it is desirable that students preparing to enter be taught this system.

For the Advanced Electrical Course,

however, the requirements are only the following:

1. Theoretical knowledge of the General Principles of Chemistry.

2. Arithmetic, Algebra through Radicals and Equations of the Second Degree, Plane Geometry, Mensuration and Plane Trigonometry.

Only practical familiarity with the rules and formulæ of these branches is required.

3. A course in Elementary Mechanics, Sound, Light and Heat, such as is given in Ganot, Deschanel or Olmstead.

CONDITIONAL ADMISSION.

A candidate failing to pass in one or more of the subjects required for admission may, at the discretion of the Faculty, be admitted to his class conditionally, to make up his deficiencies by extra study. When they are made up, he will be received into full standing in his class.

SPECIAL STUDENTS.

Young men who do not desire to take a full regular course may enter and select special shorter courses, with the sanction of the Faculty; but in all cases satisfactory examinations must be passed upon the subjects required for admission to the Freshman class.

ADMISSION TO ADVANCED STUDIES.

Candidates for admission to advanced studies *in any course* are required to pass, *in addition to the entrance examinations for that course*, examinations in the work already done by the classes which they desire to enter.

The additional subjects may be found in the programme of studies.

A certificate of honorable dismissal from another college will be received in lieu of the *Primary Entrance Examination only.*

ADMISSION TO THE POST GRADUATE COURSES.

Students of this University who have taken their *first* degree, and others, on presenting a diploma of an equivalent degree conferred elsewhere, are admitted to advanced studies, according to the plan to be found under the general subject of Graduate Students.

Note.—The acceptance of a certificate as evidence of proficiency, in lieu of examination, is at the discretion of each Professor as to the subjects in his department.

PROGRAMME OF STUDIES,

Showing the number of exercises per week for each subject, and the Text-books used.

The following is presented as the general programme of instruction, subject to such modifications from time to time as the Faculty may deem expedient, with the approval of the Trustees.

The names of the text-books studied are generally mentioned. The number of exercises per week in each subject is indicated by the figure in parentheses immediately following.

Two hours of Drawing, three of work in the Laboratory, or three of practice in the field, are regarded as equivalent to a recitation or lecture of one hour's duration.

During the year, Prof. Ringer will deliver a course of lectures on the History of Europe, from the Congress of Vienna in 1815 to the Congress of Berlin in 1878.

SCHOOL OF GENERAL LITERATURE.

This school is intended to correspond to the course long established in our older colleges, modified by the needs and requirements of modern culture. Its object is to impart a comprehensive and liberal education to those who design to enter upon professional rather than technical pursuits.

It comprises three distinct courses:

I.—The Classical Course, or Course in Arts.
II.—The Latin-Scientific Course, or Course in Philosophy.
III.—The Course in Science and Letters.

THE CLASSICAL COURSE.

This course is chiefly designed for those who purpose to study Law and Theology; it includes full and rigorous instruction in the Ancient Classics, in Elementary Science and in General Literature. The study of Mathematics in this course embraces Algebra, Geometry, Trigonometry, Analytical Geometry, and the Calculus. The programme includes Physics, Chemistry and Elementary Mechanics. There are full courses in History, in the Science of Language and in the origin and growth of the English Language. There are also lectures on Psychology, the Christian Evidences, International and Constitutional Law and Political Economy. Lectures on English Literature are supplemented by critical readings of the standard English authors. The graduate in this course obtains the degree of Bachelor of Arts (B.A.).

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Geometry (Chauvenet) completed. (4)
Chemistry.—Lectures. Fownes' Elementary Chemistry. (4)
Greek.—Homer: Odyssey. Prosody. (3)
Latin.—Livy. Prose Composition. (2)
History.—History of Greece. (2)
Physiology and Health.—Lectures. (1)
English Exercises and Declamations. (1)
Gymnasium.

SECOND TERM.

Mathematics.—Olney's University Algebra, Pt. III. Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic tables. (5)

Greek.—Xenophon: Memorabilia of Socrates. (3)

Latin.—Cicero: De Amicitia. Horace: Odes and Epodes. Composition and Prosody. (5)

History.—History of Ancient Greece and Rome. (2)

English Exercises and Declamations. (1)

Gymnasium.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry. Olney's General Geometry. (4)

Physics.—Lectures. (3)

French.—Languillier and Monsanto's Grammar. Keetel's Analytical Reader. Written and Oral Translations. (2) Or *German.*—Brandt's Grammar. Lodeman's Manual of Exercises. Joynes' Otto's Reader. (2)

Greek.—Felton's Greek Historians. (2)

Latin.—Tacitus: Agricola and Germania. Composition. (3)

History.—History of Rome. (2)

English Exercises and Declamations. (1)

Gymnasium.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

French.—Grammar. Chardenal's French Exercises. Reader (continued). Colloquial French Drill. E. Aubert. (2) Or *German.*—Grammar, Exercises and Reader (continued). (2)

English.—Coppée's Rhetoric, with Kellogg's Praxis. (1)

History.—Outlines of the World's History. (2)

Greek.—Euripides: Medea. (3)

Latin.—Quintilian: Book X. Horace: Satires and Epistles. Composition. (4)

Essays and Declamations.

Gymnasium.

JUNIOR CLASS.

FIRST TERM.

History.—Outlines of the World's History. (2)

Philosophy.—Coppée's Logic. (2)

English.—Coppée's English Literature. (4)

French.—Grammar. Chardenal's Exercises. Written and Oral Translations. Chapsal: Litterature Française. (2) Or *German.*—Grammar. Translation from German into English and *vice versa.* Reading. (2)

Greek.—Sophocles: Electra. Antiquities. (4)

Latin.—Plautus and Terence. Roman Antiquities: Wilkins. (3)

Essays and Original Orations.

Gymnasium.

SECOND TERM.

History.—History of England: Hume. (3)

Philosophy.—Schuyler's Psychology. (2) Political Economy. (2)

English.—Earle's Philology of the English Tongue. (2)

French.—Grammar. O'Connor: Choix de Contes Contemporains. Gasc's Translator. Dictation. (2) Or *German.*—Grammar. Systematic Reading of various authors. Translation. Dictation. (2)

Greek.—Aristophanes: Clouds. (3)

Latin.—Juvenal and Persius. Pliny: Select Epistles. Cruttwell's History of Roman Literature. (3)

Essays and Original Orations.

Gymnasium.

SENIOR CLASS.

FIRST TERM.

International Law.—Lectures: Woolsey. (2)

History.—Decline and Fall of the Roman Empire: Gibbon. (3)

Philosophy.—History of Philosophy: Mayor. (2)

Astronomy.—Loomis' Treatise with Lectures. (3)

French.—Grammar. Saintsbury: Specimens of French Literature. Corneille: Le Cid. Feuillet: Le Roman d'un Jeune Homme Pauvre. Lectures on French Literature. Bougeault: Litterature

Française. Compositions. (2) Or *German.*—Grammar. Systematic Readings. German Compositions. Lectures on German Literature. Scherr. (2)

[NOTE.—In both languages Conversation Class, *optional* throughout the year.]

Greek.—Pindar: Selected Odes. Greek Literature. (3)

Latin.—Lucretius, with Lectures. Roman Literature. (3)

Essays and Original Orations.

Gymnasium.

SECOND TERM.

Constitutional Law.—Lectures. (1)

History.—History of France. (2)

Philosophy.—Moral Philosophy: Janet. (2) Philosophy of History. Lectures. (2)

Christian Evidences. (1)

French.—Systematic Readings. Compositions. Lectures on French Literature. Lectures in French on Modern French Authors. Bougeault. (2) Or *German.*—Systematic Readings. German Composition. Lectures on German Literature. Scherr: Geschichte der deutschen Literatur. Lectures in German on Modern German Authors. (2)

Geology.—Lectures. Le Conte. (2)

Greek.—Demosthenes: Public Orations. Greek Literature (completed). (3)

Latin.—Catullus, Tibullus and Propertius. Cicero: de Officiis, with Lectures. Roman Literature (completed). (3)

Lectures on American and English Literature.

Preparation of Thesis.

Gymnasium.

THE LATIN-SCIENTIFIC COURSE.

The Latin-Scientific Course leading to the degree of Bachelor of Science (B.S.) is based on Latin without Greek, and designed for those who prefer studies of a philosophical nature.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Geometry (Chauvenet) completed. (4)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (4)

German.—Brandt's Grammar. Lodeman's Manual of Exercises. Writing in German Text. Translation into English. (3)

Latin.—Livy. Prose Composition. (2)

History.—History of Greece. (2)

Physiology and Health.—Lectures. (1)

English Exercises and Declamations. (1)

Gymnasium.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. Plane and Spherical Trigonometry and Mensuration. Use of the Logarithmic Tables. (5)

German.—Brandt's Grammar. Lodeman's Manual of Exercises. Translations: Joynes' Otto's German Reader. (3)

History.—History of Ancient Greece and Rome. (2)

Latin.—Cicero: De Amicitia. Horace: Odes and Epodes. Composition and Prosody. (5)

English Exercises and Declamations. (1)

Gymnasium.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Physics.—Lectures. (3)

French.—Languillier and Monsanto's Grammar. Keetel's Analytical Reader. Written and Oral Translation. (2)

German.—Brandt's Grammar. Lodeman's Manual of Exercises. Translations from German into English. (2)

History.—History of Rome. (2)

Latin.—Tacitus: Agricola and Germania. Composition. (3)

English Exercises and Declamations. (1)

Gymnasium.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

English.—Coppée's Rhetoric, with Kellogg's Praxis. (1)

French.—Grammar. Chardenal's French Exercises. Reader (continued). Colloquial French Drill. E. Aubert. (2)

German.—Grammar. Systematic Readings of various authors. Translation. Dictation. (2)

History.—Outlines of the World's History. (2)

Latin.—Quintilian: Book X. Horace: Satires and Epistles. Composition. (4)

Essays and Declamations.

Gymnasium.

JUNIOR CLASS.

FIRST TERM.

History.—Outlines of the World's History. (2)

Philosophy.—Coppée's Logic. (2)

English.—Coppée's English Literature. (4)

French.—Grammar. Chardenal's Exercises. Written and Oral Translations. Chapsal: Litterature Française. (2)

German.—Systematic Readings of various authors. Lessing, Herder, Goethe, Schiller. Dictation. Compositions in German. (2)

Latin.—Plautus and Terence. Roman Antiquities: Wilkins. (3)

Essays and Original Orations.

Gymnasium.

SECOND TERM.

History.—History of England: Hume. (3)

Philosophy.—Schuyler's Psychology. (2) Political Economy. (2)

English.—Earle's Philology of the English Tongue. (2)

French.—Grammar. O'Connor: Choix de Contes Contemporains. Gasc's Translator. Dictation. (2)

German.—Systematic Reading of various authors (continued). Dictation. Compositions in German. (2)

Latin.—Juvenal and Persius. Pliny: Select Epistles. Cruttwell's History of Roman Literature. (3)

Essays and Original Orations.

Gymnasium.

SENIOR CLASS.

FIRST TERM.

International Law.—Lectures: Woolsey. (2)

History.—Decline and Fall of the Roman Empire: Gibbon. (3)

Philosophy.—History of Philosophy: Mayor. (2)

Astronomy.—Loomis' Treatise with Lectures. (3)

French.—Grammar. Saintsbury: Specimens of French Literature. Corneille: Le Cid. Feuillet: Le Roman d'un Jeune Homme Pauvre. Lectures on French Literature. Bougeault: Litterature Française.

German.—Systematic Readings of various German authors (continued). Lectures on German Literature. Scherr: Geschichte der deutschen Literatur. Compositions. (2)

[NOTE.—In both French and German, Conversation Class *optional* throughout the year.

Latin.—Lucretius, with Lectures. Roman Literature. (3)

Essays and Original Orations.

Gymnasium.

SECOND TERM.

Constitutional Law.—Lectures. (1)

History.—History of France. (2)

Philosophy.—Moral Philosophy: Janet. (2) Philosophy of History. Lectures. (2)

Christian Evidences. (1)

Geology.—Lectures. Le Conte. (2)

Latin.—Catullus, Tibullus and Propertius. Cicero: de Officiis, with Lectures. Roman Literature (completed). (3)

French.—Systematic Readings. Compositions. Lectures on French Literature. Lectures in French on Modern French authors. Bougeault. (2)

German.—Lectures on German Literature. Scherr: Geschichte der deutschen Literatur. Lectures in German on Modern German authors. Compositions. (2)

Lectures on American and English Literature.

Preparation of Thesis.

Gymnasium.

THE COURSE IN SCIENCE AND LETTERS.

The Course in Science and Letters, leading to the Degree of Bachelor of Science (B.S.), is designed for those who wish to pursue both Scientific and Literary studies without Latin and Greek. These being omitted, extended instruction is given in French and German, History, General Literature, Mathematics and General Science.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Geometry, (Chauvenet) completed. (4)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (4)

German.—Brandt's Grammar. Lodeman's Manual of Exercises. Writing in German Text. Translation into English. (3)

Drawing.—Elementary projections, shading and lettering. (2)

History.—History of Greece. (2)

Physiology and Health—Lectures. (1)

English Exercises and Declamations. (1)

Gymnasium.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. Plane and Spherical Trigonometry and Mensuration. Use of the Logarithmic Tables. (5)

Chemistry.—Lectures and Laboratory Practice. Douglass and Prescott's Qualitative Analysis. (3)

Physics.—Lectures. (2)

History.—History of Ancient Greece and Rome. (2)

German.—Brandt's Grammar. Lodeman's Manual of Exercises. Translations. Joynes' Otto's German Reader. (3)

English Exercises and Declamations. (1)

Gymnasium.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity. Lectures and Laboratory Practice. (5)

French.—Languillier and Monsanto's Grammar. Keetel's Analytical Reader. Written and Oral Translation. (2)

German.—Brandt's Grammar. Lodeman's Manual of Exercises. Translations from German into English. (2)

History.—History of Rome. (2)

Biology.—Nicholson. (1)

English Exercises and Declamations. (1)

Gymnasium.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Light and Acoustics. Lectures and Laboratory Practice. (3)

English.—Coppée's Rhetoric, with Kellogg's Praxis. (1)

French.—Languillier and Monsanto's Grammar. Keetel's Analytical Reader. Written and Oral Translation. (2)

German.—Grammar. Systematic Readings of various authors. Translation. Dictation. (2)

Zoology.—Lectures and Laboratory work (invertebrates). (2)

History.—Outlines of the World's History. (2)

Essays and Declamations.

Gymnasium.

JUNIOR CLASS.

FIRST TERM.

History.—Outlines of the World's History. (2)

Philosophy.—Coppée's Logic. (2)

English.—Coppée's English Literature. (4)

French.—Grammar. Chardenal's Exercises. Written and Oral Translations. Chapsal: Litterature Française. (2)

German.—Systematic Readings of various authors. Lessing, Herder, Goethe, Schiller. Dictation. Compositions in German. (2)

Zoology.—Lectures and Laboratory work (vertebrates): Tenney. (3)

Crystallography.—Lectures with Practical Exercises in the determination of Crystals. (2)

Essays and Declamations.

Gymnasium.

SECOND TERM.

History.—History of England: Hume. (3)

Philosophy.—Schuyler's Psychology. (2) Political Economy. (2)

English.—Earle's Philology of the English Tongue. (2)

French.—Grammar. O'Connor: Choix de Contes Contemporains. Gasc's Translator. Dictation. (2)

German.—Systematic Reading of various authors (continued). Compositions in German. (2)

Mineralogy.—Descriptive Mineralogy, with practical exercises in the determination of Minerals. (3)

Blow Pipe Analysis.—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

Essays and Original Orations.

Gymnasium.

SENIOR CLASS.

FIRST TERM.

International Law.—Lectures: Woolsey. (2)

History.—Decline and Fall of the Roman Empire. (3)

Philosophy.—History of Philosophy: Mayor. (2)

Astronomy.—Loomis' Treatise, with Lectures. (3)

French.—Grammar. Saintsbury: Specimens of French Literature. Corneille: Le Cid. Feuillet: Le Roman d'un Jeune Homme Pauvre. Lectures on French Literature. Bougeault: Litterature Française. Composition. (2)

German.—Systematic Readings of various German authors (continued). Lectures on German Literature. Scherr: Geschichte der deutschen Literatur. Compositions. (2)

[NOTE.—In both languages, Conversation Class *optional* throughout the year.]

Geology.—Lithology and Laboratory Practice. Formation of Strata. General Definitions of Geology. (2)

Assaying.—Including the Assay by the dry methods of Gold, Silver, Antimony, Mercury, Lead, Iron and Tin ores. Ricketts. (1)

Essays and Original Orations.

Gymnasium.

SECOND TERM.

Constitutional Law.—Lectures. (1)

History.—History of France. (2)

Philosophy.—Moral Philosophy: Janet. (2) Philosophy of History. Lectures. (2)

Christian Evidences. (1)

French.—Systematic Readings. Composition. Lectures on French Literature. Lectures in French on Modern French authors. (2)

German.—Lectures on German Literature. Scherr: Geschichte der deutschen Literatur. Lectures in German on Modern German authors. Composition. (2)

Geology.—Historic, Dynamic and Economic Geology. (3)

Astronomy.—Doolittle's Practical Astronomy, with observatory work. (2)

Lectures on American and English Literature.

Preparation of Thesis.

Gymnasium.

THE SCHOOL OF TECHNOLOGY.

This School includes four distinct courses:

I. The Course in Civil Engineering.
II. The Course in Mechanical Engineering.
III. The Course in Mining and Metallurgy.
IV. The Course in Chemistry.

These have the same curriculum of studies for the first term of the Freshman year. At the end of that time the student selects his course and follows its programme.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Chauvenet's Geometry (completed). (4)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (4)

German.—Brandt's Grammar. Lodeman's Manual of Exercises. Writing in German Text. Translations into English. (3) Or

French.—Languillier and Monsanto's Practical French Course. Keetel's Analytical Reader. (3)

Drawing.—Elementary Projections, Shading and Lettering. Descriptive Geometry. (2)

English.—Exercises and Declamations. (2)

Physiology and Health.—Lectures (1)

Gymnasium.

COURSE IN CIVIL ENGINEERING.

The special studies in this course may be grouped under the heads of surveying, applied mechanics and construction. The work in surveying extends over six terms and embraces land surveying, leveling, topography, triangulation, railroad reconnaissance and location, hydrography, and the elements of geodesy. Much time is devoted to actual practice in the field and drafting room, each student being required to become proficient in the use of instruments and in taking notes for profiles and maps. The work in applied mechanics comprises the strength and elasticity of materials, the theory of the equilibrium of arches, roofs and bridges, the mechanics of machinery, hydraulics and hydraulic motors. Here the theoretical principles are illustrated by examples and problems drawn from actual engineering practice. The work in construction familiarizes the student with the qualities of materials, with masonry and foundations, the different forms of bridges, the methods employed in the building of roads and railroads, and with the arrangement of systems of water supply and sewerage. Visits of inspection to the engineering works in Bethlehem and vicinity are regularly made. Plans, drawings, and estimates of cost are prepared by each student for the construction of a line of railroad, and also for an iron railroad bridge.

Besides these special studies there is a course in astronomy which includes practical work in the observatory. The study of English and of French or German is continued, and instruction is given in mineralogy, lithology and geology.

The student who completes all the studies of this course will receive the degree of Civil Engineer (C.E.).

FRESHMAN CLASS.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (2)

Physics.—Lectures. (2)

German.—Grammar and Exercises (continued). Joynes' Otto's Reader. Translations. (3) Or *French.*—Grammar. Keetel's Reader. Translations. (3)

Drawing.—Projection Drawing. Descriptive Geometry. Free-hand Drawing. (4)

English.—Exercises and Declamations. (2)

Gymnasium.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity. Lectures and Laboratory Practice. (5)

German.—Grammar. Exercises. Translations. Readings. (2) Or *French.*—Grammar. Chardenal's Exercises. Readings. Translations. (2)

Drawing.—Isometric Drawing. Architectural Drawing. (2)

Surveying.—Use of the Chain and Compass. Surveys and Maps of Farms. Colored Topography. (2)

English.—Exercises and Declamations. (1)

Gymnasium.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Acoustics, Light. Lectures and Laboratory Practice. (3)

German.—Grammar. Exercises. Systematic Readings. Translations. Dictation. (2) Or *French.*—Grammar. Dictation. Chardenal's Exercises. O'Connor: Choix de Contes Contemporains. (2)

Mechanics.—Mathematical Theory of Motion. Science of Motion in General. Statics. Dynamics, and Statics of Fluids. Lectures on the Theory of Center of Gravity and Moment of Inertia. (4)

Surveying.—Use of the Level and Transit. Profiles and Contour Maps. Determination of Heights and Distances. Topographical Drawing. (3)

Essays and Declamations.

Gymnasium.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

German.—Systematic Readings. Translation. Dictation. Compositions. (2) Or *French.*—Translation. Readings. Feuillet: Le Roman d'un Jeune Homme Pauvre. Saintsbury: Specimens of French Literature. (2)

[NOTE.—In both languages, conversation class *optional* throughout the year.]

Surveying.—Triangulation. Leveling. Topographical Surveys and Maps. Stadia Measurements. (4)

Strength of Materials.—Elasticity and Strength of Wood, Stone, and Metals. Theory of Columns, Shafts and Beams. Reports on the Testing of Materials. (4)

Construction.—Materials of Construction. Masonry. Foundations. Construction of Roads and Pavements. (2)

Crystallography.—Lectures, with practical exercises in the determination of Crystals. (2)

Essays and Declamations.

Gymnasium.

SECOND TERM.

German.—Systematic Readings. Compositions. Lectures on German Literature: Scherr. Deutsche Literatur. (2) Or *French.*—Reading. Dictation. Compositions. Lectures on French Literature. Bougeault. (2)

Surveying.—Railroad Reconnoissance and Location. Survey of a Line, with Profile, Map and Estimate of cost. (4)

Roofs and Bridges.—Theory and Calculation of Strains. (2)

Construction.—Stone cutting with practical Drawings. (3) Construction and maintenance of Railroads. Theory of Retaining Walls. (2)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. (3)

Essays and Original Orations.

Gymnasium.

SENIOR CLASS.

FIRST TERM.

Astronomy.—Loomis' Treatise, with Lectures. (3)

Graphical Statics.—Analysis of Roof Trusses and Arches. (2)

Roofs and Bridges.—Reports on stability of Bridges; Design for an Iron Railroad Bridge. (4)

Surveying.—Use of Plane Table and Sextant. Precise Triangulation. Hydrographic Surveying. (3)

Mechanics of Machinery.—Pile drivers, Cranes and Elevators. The Locomotive. (2)

Geology.—Lithology, with practical exercises in determining rocks. (2)

Gymnasium.

SECOND TERM.

Astronomy.—Doolittle's Practical Astronomy, with Observatory Work. (2)

Surveying.—Elements of Geodesy. Elements of Method of Least Squares. Use of Solar Compass. (2)

Hydraulics.—Hydrostatics. Flow of water in pipes and rivers. Hydraulic motors. (2)

Construction.—Suspension Bridges and Arches. Water supply, sewerage, and sanitary engineering. Specifications and Contracts. (5)

Geology.—Historic and dynamic. Le Conte. (2)

English Literature.—Lectures. Coppée. (2)

Christian Evidences.—Lectures. (1)

Preparation of Thesis.

Gymnasium.

THE COURSE IN MECHANICAL ENGINEERING.

The object of this course is the study of the Science of Machines; the principal subjects taught are: the nature, equivalence and analysis of mechanisms, the mechanics or theory of the principal classes or types of machinery, Mechanical Technology and the principles and practice of Machine Design.

That the students may obtain the practical engineering data which they will most need when beginning their work as mechanical engineers, they are required to pursue a course of Shop Instruction which does not necessarily involve manual labor and manipulation of tools but is principally devoted to familiarizing them with those points in pattern-making, moulding, forging, fitting and finishing, which they need to know as designers of machinery. Particular attention is therefore directed to the forms and sizes of machine parts that can be readily constructed in the various workshops, to the time that it takes to perform and the order of the various operations, to the dimensions most needed by workmen (in order that the students may learn to dimension working-drawings judiciously) and to the various devices—ordinarily escaping the beginner's notice—for increasing the accuracy of the work, durability of the parts, conveniences of manipulation and safety of the workmen. This involves acquaintance with the processes and machinery of the workshops, but it is the foreman's and superintendent's knowledge which is required rather than the manual dexterity and skill of the workman and tool hand. The acquirements peculiar to the latter are by no means despised, and students are encouraged to familiarize themselves therewith during leisure hours, but manual work in the shops forms no regular part of the course. On the contrary, the student enters the shop with hands and mind free to examine all the processes, operations and machinery, and ready at any moment at the call of the teacher, to witness an operation of special interest or to examine into the causes of and remedies for any sudden breakdown. Dressed in overalls and provided with note-book, pencil, calipers and measuring rule, the student sketches the important parts of the various machine-tools, notes down the successive steps of each of the important shop-processes as illustrated by the pieces operated upon, and, having first obtained a clear idea from the working drawing of what is about to be constructed, follows pieces of work through the shops from the pig or merchant form to the finished machine.

That the students may learn to observe carefully and be trained to think and observe for themselves-in these matters, there is required of them a full description of the various processes, operations and tools involved in the production of each one of a series of properly graded examples of patterns, castings, forgings and finished pieces which are not being constructed in the shops at the time and the drawings or blue prints for which have been given to them on entering the shops. The student's work is directed not only by these drawings and by the printed programme given him at the start, but also personally by a teacher, who accompanies him into the shops, gives necessary explanations, and tests the extent and accuracy of his knowledge by examining the sketches and notes, and by frequent questioning. Finally the results of the observations and the sketches are to be neatly embodied in a memoir.

During the course there are frequent visits of inspection to engineering works, both in and out of town, with special reference to such subjects as Prime Movers, Machinery for lifting, handling and transporting, and Machinery for changing the form and size of materials. It is intended that each of these excursions shall have some definite purpose in view which must be fully reported by the students.

The instruction in Machine Design, during the second term of the Junior year, consists in determining rational and empirical formulas for proportioning such machine parts as come under the head of fastenings, bearings, rotating, sliding and twisting pieces, belt and toothed gearing, levers and connecting rods, also in comparing recent and approved forms of these same parts with respect to their advantages as regards fitness, ease of construction and durability, and in making full-sized working-drawings of these parts; all the dimensions are determined by the students from the above mentioned formulas, the data being given as nearly as possible as they would arise in practice. During the Senior year, the students undertake the calculations, estimates and working drawings involved in the design of a simple but complete machine, each student being engaged upon a different machine. From the finished drawings of each machine, tracings are made and then "blue prints" taken for distribution among the other members of the class. The whole class also take up the design of a steam engine, every dimension being determined by the students, and complete working-drawings made. In the case of the simple machines and of the steam engine, the general plan or arrangement will be given to the students in the form of rough sketches, photographs or wood-cuts. This work will continue to the middle of the last term of the Senior year. From this time on the students are expected to make original designs for simple mechanisms, whose object has been fully explained. Throughout the course the work in the draughting room is carried on as nearly as possible like that of an engineering establishment, and special attention is paid to methods of expediting the work of calculation by means of simple formulas, tables and diagrams.

The graduate in this course will receive the degree of Mechanical Engineer (M.E.).

FRESHMAN CLASS.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (2)

German.—Grammar and Exercises (continued). Joynes' Otto's Reader. Translations. (3) Or *French.*—Grammar. Keetel's Reader. Translations. (3)

Physics.—Lectures. (2)

Drawing.—Projection Drawing. Descriptive Geometry. Free-hand Drawing. (4)

English.—Exercises and Declamations. (2)

Gymnasium.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity. Lectures Laboratory Practice in these branches and Mechanics. Barometric leveling and Measurement of heights. (5)

Drawing.—Isometrical Drawing. Architectural Drawing. (2)

Visits of Inspection.—Shops of the vicinity. (2)

German.—Grammar. Exercises. Translations. Readings. (2) Or *French.*—Grammar. Chardenal's Exercises. Readings. Translations. (2)

English.—Exercises and Declamations. (1)

Gymnasium.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Acoustics, Light. Lectures and Laboratory Practice. (3)

German.—Grammar. Exercises. Systematic Readings. Translations. Dictation. (2) Or *French.*—Grammar. Dictation. Chardenal's Exercises. O'Connor: Choix de Contes Contemporains. (2)

Mechanics.—Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Lectures on Theory of Center of Gravity and Moment of Inertia. (4)

Steam Engine.—Rigg's practical Treatise. (3)

Essays and Declamations.

Gymnasium.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

German.—Systematic Readings. Translation. Dictation. Compositions. (2) Or *French.*—Translation. Readings. Feuillet: Le Roman d'un Jeune Homme Pauvre. Saintsbury: Specimens of French Literature. (2)

[NOTE.—In both languages, conversation class *optional* throughout the year.]

Mechanical Technology.—Shop instruction. Examination of the processes and appliances involved in pattern making, molding, forging, fitting and finishing, with sketches and reports. (7)

Boilers.—Wilson. Strength, construction and wear and tear of boilers. (1)

Strength of Materials.—Elasticity and strength of wood, stone and metals. Theory of beams, shafts and columns. Reports on experimental tests. (4)

Essays and Declamations.

Gymnasium.

SECOND TERM.

German.—Systematic Readings. Compositions. Lectures on German Literature: Scherr. Deutsche Literatur. (2) Or *French.*—Reading. Dictation. Compositions. Lectures on French Literature. Bougeault. (2)

Kinematics of Machinery.—Reuleaux. Nature and Equivalence of Mechanisms. (3)

Machine Design.—Proportioning of such machine parts as come under the head of fastenings, bearings, rotating and sliding pieces, belt and toothed gearing, levers and connecting rods. (5)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (4)

Machinery of Transmission.—Weisbach-Herrmann. (2)

Essays and Original Orations.

Gymnasium.

SENIOR CLASS.

FIRST TERM.

Thermodynamics.—General principles; application to Steam Engines and Air Compressors. (3)

Graphical Statics.—Graphical analysis of Roof Trusses and Girders. (2)

Machine Design.—Calculations and working-drawings for a High Speed Steam Engine. (4)

Kinematics.—Diagrams of the changes of position, speed and acceleration in mechanisms. Link and valve motions. Quick return motions. Parallel Motions. Laying out of Cams. (3)

Mechanics of Machinery.—Weisbach-Herrmann. Hoisting Machinery, Accumulators, Cranes and Locomotives. (4)

Gymnasium.

SECOND TERM.

Mechanics of Machinery.—Weisbach-Herrmann. Pumps, Pumping Engines, Blowing Engines, Compressors and Fans. (4)

Machine Design.—Calculations and working-drawings for the following machines: Drilling, Shaping, Milling, Shearing and Punching Machines, Hoists, Pumps and Stone Crushers. Original Designs. (5)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels; hydraulic motors. (2)

Measurement of Power.—Indicating of Steam Engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

English Literature.—Lectures. Coppée. (2)

Christian Evidences.—Lectures. (1)

Preparation of Thesis.

Gymnasium.

THE COURSE IN MINING AND METALLURGY.

In addition to the physics, chemistry, literature, higher mathematics and mechanics necessary to all technical education, the scheme of studies comprises courses in mining, metallurgy, geology, mineralogy, dynamics, qualitative and quantitative analysis, blowpipe analysis, topographical and mine surveying and drawing. On account of the great number and scope of the studies necessary to the completion of this course, it is five years in length.

The graduate in this course will receive the degree of Engineer of Mines (E.M.).

At the completion of the fourth year of this course, the student will receive the degree of Bachelor of Science in Mining (B.S.).

In the course of mineralogy, geology and analytical chemistry, much attention is paid to the practical instruction of the student in determining minerals by their crystallographical and physical properties, and, by the aid of blowpipe analysis, in the determination of rocks; in the qualitative and quantitative examination of ores and metallurgical products and in the rapid methods of assaying ores by the dry and wet ways employed in metallurgical laboratories. The location of the University in the vicinity of the iron works of the Lehigh Valley and especially of the extensive establishment of the Bethlehem Iron Company, affords unusual facilities for the practical study of iron metallurgy. The processes for the manufacture of spelter and oxide of zinc may be studied at the Bethlehem Zinc Works. The facilities for the practical study of mining and economic geology are not excelled by those of any other Institution in the country. The zinc mines at Friedensville and the brown hematite and slate deposits of the Lehigh Valley are in the immediate vicinity, while within easy reach by rail are the anthracite coal fields of Pennsylvania, the iron and zinc mines of New Jersey, and the celebrated iron mines at Cornwall, Pa.

FRESHMAN CLASS.

SECOND TERM.

Mathematics.—Olney's University Algebra, Pt. III. Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic tables. (5)

Chemistry.—Lectures and Laboratory Practice. Douglass and Prescott's Qualitative Analysis. (3)

Stoichiometry. (1)

Physics.—Lectures. (2)

German.—Grammar and Exercises (continued). Joynes' Otto's Reader. Translations. (3) Or *French.*—Grammar. Keetel's Reader. Translations. (3)

English.—Exercises and Declamations. (2)

Gymnasium.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry : Olney's General Geometry.(4)

Physics —Heat, Meteorology, Magnetism and Statical Electricity, Lectures and Laboratory Practice. (5)

Drawing.—Freehand Drawing. (1)

Chemical Philosophy.—Cooke. (3)

German.—Grammar. Exercises. Translations. Reading. (2) Or *French.*—Grammar. Chardenal's Exercises. Readings. Translations. (2)

English.—Exercises and Declamations. (1)

Gymnasium.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Laboratory Practice. (1)

Mechanics.—Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Lectures on Theory of Center of Gravity and Moment of Inertia. (4)

Chemistry.—Quantitative Analysis: Laboratory Work: Fresenius. (2) The following analyses are executed by the student:

1. Iron Wire (Fe)
2. Bronze (Cu, Sn, Zn, Pb)
3. Silver Coin (Au, Ag, Pb, Cu)
4. Zinc Ore (Zn) By both Gravimetric and Volumetric Methods.

Drawing.—Projection Drawing. Descriptive Geometry. (3)

German.—Grammar. Exercises. Systematic Readings. Translations. Dictations. (2) Or *French.*—Grammar. Dictation. Chardenal's Exercises. O'Connor: Choix de Contes Contemperains. (2)

Essays and Declamations.

Gymnasium.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

Strength of Materials.—Elasticity and strength of wood, stone and metals. Theory of beams, columns and shafts. (4)

Crystallography.—Lectures with Practical Exercises in the determination of Crystals. (2)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (3) The following analyses are executed by the student:

5. Copper Ore (Cu)
6. Spiegeleisen (Mn)
7. Lead Ore (PbS)

8. Ilmenite (TiO_2)
9. Iron Ore (Complete Analysis)
10. Limestone (Complete Analysis)

Assaying.—Including the Assay by the dry methods of Gold, Silver, Antimony, Mercury, Lead, Iron and Tin ores. Laboratory Work. Ricketts. (2)

German.—Systematic Readings. Translation. Dictation. Compositions. (2) Or *French.*—Translation. Readings. Feuillet: Le Roman d'un Jeune Homme Pauvre. Saintsbury: Specimens of French Literature. (2)

[NOTE.—In both languages, conversation class *optional* throughout the year.]

Essays and Original Orations.

Gymnasium.

SECOND TERM.

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals: E. S. Dana. (3)

Blow-Pipe Analysis.—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

Chemistry.—Fresenius' Quantitative Analysis. (3) The following analyses are executed by the student:

11. Coal (Volatile Matter, Fixed Carbon, Ash, H_2O, S, P)
12. Slag (Complete Analysis)
13. Pig Iron (Complete Analysis)

Steam Engine.—Rigg's practical treatise. (3)

Roofs and Bridges.—Theory and calculation of strains in framed trusses. (2)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles and Contour Maps. (2)

German.—Systematic Readings. Compositions. Lectures on German Literature: Scherr. Deutsche Literatur. (2) Or *French.*—Reading. Dictation. Compositions. Lectures on French Literature. Bougeault. (2)

Essays and Original Orations.

Gymnasium.

SENIOR CLASS.

FIRST TERM.

Geology.—General Geological Definitions and Principles. Dynamic Geology. (3)

Lithology.—Theory, with practical exercises in determining rocks. (3)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (1) The following Analysis is executed by the student:

14. Nickel Ore (Ni,Co)

Drawing.—Elements of Colored Topography. (2)

Thermodynamics.—General principles; application to Steam Engines and Air Compressors. (3)

Surveying.—Triangulation. Leveling. Topographical Surveys and Maps. Stadia Measurements. (4)

Gymnasium.

SECOND TERM.

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (4)

Mining.—Modes of Occurrence of the Useful Minerals. Searching for Mineral deposits. Examination of Mining Properties. Boring. Mining Tools, Machines and Processes. Timbering and Masonry. Callon. André. (3)

Mine Surveying.—Theory and practice. (1)

Chemistry.—Fresenius' Quantitative Analysis. (2) The following Analyses are executed by the student:

15. Carbon in Steel (Volumetric)
16. Gas Analysis (Complete Analysis of Illuminating Gas)

Geology.—Historic Geology. Lectures. Le Conte. Dana. (3)

Blow-pipe Analysis.—Practice. (1)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (2)

Gymnasium.

POST-SENIOR CLASS.

FIRST TERM.

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (5)

**Mining.*—Methods of Working. Underground Transportation. Hoisting, Drainage and Pumping. (3) Ventilation and Lighting. Hygiene of Mines. (2)

**Mechanics of Machinery.*—Weisbach-Herrmann. Hoisting Machinery, Accumulators, Cranes. (2)

Astronomy.—Descriptive Astronomy: Loomis. (3)

Drawing.—Geological Sections and Maps. (1)

SECOND TERM.

Mining.—Mechanical Preparation of Ores. Coal Washing. (1)

Economic Geology.—Lectures. (1)

Mechanics of Machinery.—Pumps, Pumping-Engines, Blowing-Engines, Compressors and Fans. (4)

Astronomy.—Doolittle's Practical Astronomy, with Observatory Work. (2)

Drawing.—Mining Plant. Systems of Timbering. (3)

Projects.—In Mining, Geology and Metallurgy. (2)

English Literature.—Lectures. Coppèe. (2)

Christian Evidences.—Lectures. (1)

Preparation of Thesis.

* The Ventilation, Lighting and Hygiene are completed in the first half of the term by taking four exercises per week. The Mechanics of Machinery is then begun.

THE COURSE IN CHEMISTRY.

IN THEORETICAL CHEMISTRY.—This course begins with lectures in Inorganic Chemistry, in the Freshman year, with recitations in Stoichiometry, followed by recitations for a year in Cooke's Chemical Philosophy and concluded by a course of lectures and recitations in Organic Chemistry.

IN ANALYTICAL CHEMISTRY, the students take up Qualitative Analysis, by lectures and laboratory practice. During the succeeding year and a half, Inorganic Quantitative Analysis is studied, by lectures and laboratory practice, the analyses mentioned below being performed by each student.

ORGANIC CHEMISTRY.—The subsequent year is chiefly devoted to laboratory work in Organic Chemistry, including ultimate Organic

Analysis, the determination of vapor densities, the preparation of pure organic substances, their analysis and physical examination, and original investigation.

SANITARY CHEMISTRY.—Attention is given to the examination of Air, Water, Food and other subjects connected with this study during the Senior year.

ASSAYING.—The Assaying of ores by furnace assay is taught in the senior year, together with gold and silver bullion analysis by processes as practiced in the United States Mint.

GAS ANALYSIS and VOLUMETRIC ANALYSIS are taught in the Junior year.

INDUSTRIAL CHEMISTRY.—This branch is taught by lectures and laboratory practice. The laboratory for this purpose is supplied with complete working Models for the Manufacture of Illuminating Gas, for the production of Alcohol, and for the Refining of Cane Sugar. It is intended to add to these apparatus for Dyeing, Bleaching and Calico Printing. Instruction will thus be given by practical problems in these branches of Industrial Chemistry, including as well the examination of the raw materials and manufactured products. Various industrial establishments in the immediate vicinity and in New York and Philadelphia are visited by the students in company of an Instructor.

TOXICOLOGICAL AND AGRICULTURAL CHEMISTRY.—Courses of lectures on these subjects are given in the Junior and Senior years.

The course also includes thorough instruction in Physics, Mineralogy and Blow-pipe Analysis, Metallurgy and Geology.

The last term of the Senior year is mainly devoted to the preparation of a Thesis on some subject, selected by the Professor, involving practical work in the Laboratory in addition to the literary labor, and each graduate will thus make a contribution to the progress of the science as a preliminary to the reception of his degree.

The course is thus seen to include thorough instruction in theoretical and applied chemistry, in their various branches, as well as in those cognate sciences of such great value to the chemist.

The Laboratories are under the immediate charge of the Professor and his Assistants, and, together with the Lecture-room, are unsurpassed in excellence by any similar establishment in the country, being supplied with all the modern improvements. The collections of apparatus, specimens and models, illustrating theoretical and applied chemistry, are already important and rapidly increasing.

Students are charged for the chemicals and apparatus consumed. If the student is moderately careful, this expense need not exceed $60 per year.

The graduate of this course will receive the degree of Analytical Chemist (A.C.).

FRESHMAN CLASS.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (2)

Chemistry.—Lectures and Laboratory Practice. Douglass and Prescott's Qualitative Analysis. (3)

German.—Grammar and Exercises (continued). Joynes' Otto's Reader. Translations. (3) Or *French.*—Grammar. Keetel's Reader. Translations. (3)

Physics.—Lectures. (2)

Stoichiometry. (1)

English.—Exercises and Declamations. (2)

Gymnasium.

SOPHOMORE CLASS.

FIRST TERM.

Chemical Philosophy.—Cooke. (3)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (3)

The following analyses are executed by the student:

1. Iron Wire (Fe)
2. Potassium Dichromate (Cr_2O_3)
3. Barium Chloride (Ba, Cl, H_2O)
4. Magnesium Sulphate (MgO, SO_3 H_2O)
5. Disodium Hydrogen Phosphate (P_2O_5)
6. Bronze (Cu, Sn, Zn, Pb)
7. Rochelle Salt (K_2O, Na_2O)

Quantitative Analysis.—Conference. (1)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity. Lectures. Laboratory Practice in these branches and Mechanics. Barometric Leveling and Measurement of heights. (5)

German.—Grammar. Exercises. Translations. Reading. (2) Or *French.*—Grammar. Chardenal's Exercises. Readings. Translations. (2)

English.—Exercises and Declamations. (1)

Gymnasium.

SECOND TERM.

Physics.—Galvanism, Acoustics, Light. Lectures and Laboratory Practice. (3)

German.—Grammar. Exercises. Systematic Readings. Translations. Dictation. (2) Or *French.*—Grammar. Dictation. Chardenal's Exercises. O'Connor: Choix de Contes Contemporains. (2)

Quantitative Analysis.—Fresenius' Quantitive Analysis. (5)

The following analyses are executed by the student:

8. Volumetric Determination of Chlorine.
9. Acidimetry (HCl, H_2SO_4, HNO_3, $HC_2H_3O_2$)
10. Alkalimetry (KOH, $NaOH$, NH_4OH, Soda Ash, Pearl Ash)
11. Chlorimetry (Bleaching Powders)
12. Silver Coin (Au, Ag, Pb, Cu)
13. Zinc Ore (Zn) By both Gravimetric and Volumetric Methods.
14. Copper Ore (Cu)
15. Spiegeleisen (Mn)
16. Lead Ore (Pb, S)
17. Ilmenite (TiO_2)
18. Iron Ore (Complete Analysis)
19. Limestone (Complete Analysis)
20. Coal (Volatile Matter, Fixed Carbon, Ash, H_2O, S, P)
21. Slag (Complete Analysis)

Quantitative Analysis.—Conference. (1)

Blow-Pipe Analysis.—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

Chemical Philosophy. (3)

Essays and Declamations.

Gymnasium.

JUNIOR CLASS.

FIRST TERM.

Toxicology.—Lectures. (2)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (5)

The following analyses are executed by the student:

22. Guano (NH_3, P_2O_5, H_2O)
23. Clay (Complete Analysis)
24. Manganese Ore (MnO_2)
25. Mineral Water (Complete Analysis)
26. Pig Iron (Complete Analysis)
27. Nickel Ore (Ni, Co)
28. Carbon in Steel (Volumetric)
29. Gas Analysis (Complete Analysis of Illuminating Gas)

Quantitative Analysis.—Conference. (1)

Organic Chemistry.—Lectures and Recitations. (4)

Crystallography.—Lectures, with Practical Exercises in the Determination of Crystals. (2)

German.—Systematic Readings. Translation. Dictation. Compositions. (2) Or *French.*—Translation. Readings. Feuillet: Le Roman d'un Jeune Homme Pauvre. Saintsbury: Specimens of French Literature. (2)

[NOTE.—In both languages, conversation class *optional* throughout the year.]

Essays and Original Orations.

Gymnasium.

SECOND TERM.

Organic Chemistry.—Laboratory. (5)

Organic Chemistry.—Conference. (1)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (4)

German.—Systematic Readings. Compositions in German. (2) Or *French.*—Systematic Readings. Compositions. (2)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

Essays and Original Orations.

Gymnasium.

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (5)

Assaying.—Including the Assay by the dry methods of Gold, Silver, Antimony, Mercury, Lead, Iron and Tin ores. Ricketts. (2)

Organic Chemistry.—Laboratory. (5)

Organic Chemistry.—Conference. (1)

Geology.—Lithology with practical exercises in determining rocks. (3)

Gymnasium.

SECOND TERM.

Industrial Chemistry.—Lectures and Laboratory. (4)

Agricultural Chemistry.—Lectures. (1)

Sanitary Chemistry.—Laboratory. (1)

Geology.—Historic and Dynamic Geology. Lectures. Le Conte. (2)

Christian Evidences.—Lectures. (1)

English Literature.—Lectures. Coppée. (2)

Preparation of Thesis. (5)

Gymnasium.

THE ADVANCED COURSE IN ELECTRICITY.

This course has been established to answer the growing demand for more extensive and thorough knowledge of the subject of Electricity and its application to Machines, Telegraphy, Electric Lighting, etc.

Instead of an extended department of Electrical Engineering including full courses of Mathematics, Mechanics, Chemistry, etc., and extending over four years, it is thought best to offer for the present a course, occupying not more than one year and presenting very fully the purely electrical portion of an Electrical Engineering course, with only such outside branches as are absolutely necessary for the proper understanding of this single subject.

Those persons whose time is limited and who desire to take up any of the leading industrial applications of Electricity; or those, who having already been engaged in such work, are familiar with the practice, but wish to gain a knowledge of the theory and scientific principles involved, will find this course very desirable.

During the past year the scope of this course has been widened so as to accomplish another purpose. The facilities for the study of the other branches of Physics—Mechanics, Heat, Light and Meteorology have been greatly increased; so that any one wishing to take a special course in Physics alone, will find in this department a better opportunity for attaining his object than is afforded by the regular curriculum of the University.

FIRST TERM.

Magnetism and Electricity.—Text-book (S. P. Thompson) and Lectures. Electrical Arithmetic (Day's). (5)

Mechanics.—(Laboratory work.) Precise measurements with beam-compass, spherometer, cathetometer, micrometers, etc. Testing balances. Specific gravities of solids, liquids and gases by all known methods, with balances, hydrometers, comparison of densities and cathetometer, etc.; with corrections for temperature and buoyancy of air, etc. Laws of gravity, with determinations by Atwood's machine, pendulum, etc. Electricity; Young's modulus by stretching, flexure and torsions, tenacity of wires, superficial tension by capillary tubes of different liquids. Work with mercurial and aneroid barometers, with all corrections and reductions, to freezing point, sea level, etc.; measurement of heights and leveling roads. (3)

Magnetism and Static Electricity.—(Laboratory work.) Making and testing permanent magnets. Verification of laws by Coulomb's torsion balance. Measurements of portative force, strength of pole, effects of heating, percussion, etc. Study of the distribution of magnetism and drawing magnetic curves. Investigation of local attraction, variation of magnetic needle and intensity of earth's magnetism.

Construction of electroscopes, condensers. Determination of electrical character of many substances. Verification of laws of electrical attraction and repulsion. Measurements of conductivity, electric density and capacity. Study of laws of Static induction, specific inductive capacity, etc., and of condensers. Analysis of machines, electrophorus, plate glass machines, Holtz's, etc. (5)

Meteorology.—Text book (Loomis) and practice. Observations for one month as taken in the U. S. Signal Service stations; with all the usual corrections and reductions; construction of charts; mapping curves, etc. (5)

Drawing.—Elementary Projections. Freehand Drawing. (3)

SECOND TERM.

Dynamic Machinery.—Text-book (S. P. Thompson) and lectures.

Electric Lighting.—Text-book (Du Moncel) and lectures.

Telegraph.—Lectures. (5)

Sound, Heat and Light.—(Laboratory work.) Determination of number of vibrations of notes with Siren, comparison of pitch of tuning forks. Determination of velocity of sound in air. Verification of laws of vibrations of strings. Determination of absolute pitch of notes by the monochord and of wave lengths of notes by sensitive flames. Making and testing thermometers; determinations of freezing and boiling points of different substances; of coefficients of expansion of solids, liquids and gases; of specific heat of bodies by the known methods and of latent heat of fusion and vaporization. Humidity by various methods. Verification of the laws of light. Photometry; testing intensities of lights with Bunsen's, Rumford's, Foucault's and daylight photometers. Tests of absorptive power of different substances. Index of Refraction of unknown substances by various methods. Measurements of focal lengths of lenses and mirrors. Construction of optical instruments, finding magnifying power, etc. Spectroscopic work; mapping Frauenhofer lines; identification of unknown substances in solution; absorption spectra (solids and liquids); comparison of spectra; mapping of spectra. Interference. Diffraction spectra. Construction of polariscopes; laws of polarization by reflection and double refraction. Study of uniaxial and biaxial crystals. (3)

Dynamic Electricity.—(Laboratory work.) Setting up, use and care of all batteries in common use, Grove's, Daniel's, LeClanchè's, Bichromate, Bunsen's, Smee's, Gravity, etc.; Secondary batteries, Plantè's, Faure's. Construction of electro-magnets; tests for portative force and strength of pole under varying conditions of current strength, size of wire, number of coils, length and diameter of cores etc. Laws of currents. Electro-Dynamics. Testing thermo-electric batteries, Noë's and Clamond's. Electrolysis, electrotyping and electroplating. Making induction coils; testing different orders of induced currents and extra currents. Similar study of magnetic induction. Analysis and tests of electro-magnetic and dynamic machines. Diamagnetism. (5)

Electrical Measurements.—(Laboratory work.) Practical construction of instruments; sine, tangent and differential galvanometers, ammeters, voltameters, resistance coils, commutators, etc. Verification of Ohm's laws under varying conditions of electromotive force and external and internal resistance. Measurement of resistance of solid and liquid conductors in single and divided circuits; and of effects of change in temperature: of internal resistance, electromotive force and current strength of voltaic batteries. Measurements of quantitative laws of electrolysis, comparisons of voltameters and galvanometers. Testing electric lights. Photometric measurements of incandescent lamps; Swan's, Lane-Fox's, Maxim's, Edison's, etc.; and of arc lamps, Weston's, Thompson-Houston's, etc. Spectroscopic study of all these lights and mapping their spectra.

Photographing the lines of force of the field magnets of various types of dynamos. Measurements of current strength, difference of potential and resistance of dynamos. Study of different plants and systems of dynamos by visits to manufactories and working systems.

Telegraphic measurements; measuring and testing lines for conductivity, insulation, location of faults, etc. (2)

PHYSICAL CULTURE.

The Gymnasium is open morning, afternoon and evening, in all, 45 hours a week. Exercise in it is required of all students who are fitted to take it. Class drill with the Instructor and individual exercise are prescribed.

GRADUATING THESES.

Every student will be required to present a thesis upon some topic connected with his special course, as a necessary portion of the exercises for his final examination for a diploma. These theses shall be accompanied by drawings and diagrams, when the subjects need such illustration. The originals will be kept by the University, as a part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed all the examinations in a regular course and is signed by the President and Secretary of the Board of Trustees and by the Faculty of the University. For all the partial courses a certificate, signed by the President and the Secretary of the Faculty, is given showing what the student has accomplished.

GRADUATE STUDENTS.

Graduate students wishing to remain a year or more and pursue a course of study as candidates for another Degree may do so with the sanction of the Faculty. Those wishing to take *special* courses of study will be afforded every facility for so doing.

POST GRADUATE DEGREES.

M. A.

The Faculty will recommend for the Degree of Master of Arts any Candidate, otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Arts, shall pursue, for at least one year at this University, or two years elsewhere, a course of liberal study prescribed by the Faculty in at least two departments, pass a satisfactory examination in the same and present a satisfactory Thesis.

M. S.

The Faculty will recommend for the Degree of Master of Science any Candidate, otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Science, or any Degree in the School of Technology, shall pursue, for at least one year at this University, or two years elsewhere, a course of study prescribed by the Faculty in at least two departments, pass a thorough examination in the same and present a satisfactory Thesis.

Ph. D.

The Faculty will recommend for the Degree of Doctor of Philosophy any Candidate, otherwise properly qualified, who, after taking at this University the Degree of Master of Arts or Master of Science, shall pursue, for at least one year at this University, or two years elsewhere, a course of advanced study prescribed by the Faculty, pass a thorough examination in the presence of the Faculty in the same and present a satisfactory Thesis giving evidence of original investigation.

The Candidate shall have a good knowledge of Latin and either French or German.

The Theses presented by Candidates for Post Graduate Degrees shall be retained by the University.

THE UNIVERSITY LIBRARY.

The Library building was erected by the Founder of the University in 1877, at a cost of One Hundred Thousand Dollars, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the same year more than Twenty Thousand Dollars were contributed by the family and friends of that estimable woman, as a memorial fund for the purchase of books. By the will of the Founder of the University a fund of $500,000 has been given for the permanent endowment of the library.

The building is semi-circular in plan, with a handsome façade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior, the center is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling ; two galleries affording access to the upper cases. Shelf room is now provided for Eighty Thousand Volumes. The building is thoroughly fireproof, well lighted, and heated by steam.

Sixty thousand volumes are now upon the shelves including many extremely valuable works. The list of periodicals numbers about fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public ; both of which conditions are in accord with the terms of the gift.

REGULATIONS OF THE LEHIGH UNIVERSITY LIBRARY.

I. The Library is open every day, except Sundays and Legal Holidays, from 8 A. M. until 10 P. M., and on Sundays for the students and others connected with the University from 1.30 P. M. until 9.30 P. M.

II. Admission is free to all persons over 16 years of age.

III. Readers are required to write their names and addresses in the Daily Register of the Library. They also write the name of the book desired upon a Library Card, with their signatures, and present the same to the Director's Clerk, who supplies the book, retaining the card as a receipt. Before leaving the Library, readers return their books to the clerk, and receive their cards.

IV. No book is permitted, under any circumstances, to be taken from the Library.

V. No person is allowed to enter the alcoves, or remove any book from the shelves, without permission of the Director.

VI. Readers wishing to consult the more valuable illustrated works make special application for that purpose.

VII. In taking notes, pencils, and not pens and ink, are to be used.

VIII. Audible conversation and the use of tobacco are strictly forbidden in any part of the Library.

IX. Any person not conforming to these Regulations, will be denied the privilege of the Library.

X. Any person, who defaces, in any way, any book, magazine or paper, or the furniture, or anyportion of the building, in addition to being deprived of the privileges of the Library, will be prosecuted according to law.

OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an Astronomical Observatory was erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted an Equatorial Telescope, of six inches aperture, by Alvin Clark & Sons. The west wing contains a superior Sidereal Clock, by Wm. Bond & Sons; a Zenith Telescope, by Blunt, and a Field Transit, by Stackpole. There is also a Prismatic Sextant, by Pistor & Martins.

Students in Practical Astronomy receive instruction in the use of the instruments and in actual observation.

The grounds upon which the Observatory stands, consisting of seven acres of land adjoining the original grant, was presented to the University by Charles Brodhead, Esq , of Bethlehem.

An advanced course in Astronomy and the higher Analysis has been established, requiring two years for its completion. It is adapted to the attainments of the graduates of this University, but, is open to any one who may be prepared to pursue it.

This course embraces the following subjects:

First Year. — Spherical Astronomy. Theory of Instruments. Method of Least Squares. Numerical Calculus.

Second Year.—Celestial Mechanics. Interpolation and Quadrature. Computation of Orbits and Perturbations.

During the entire course the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

STUDENTS' SOCIETIES.

THE CHEMICAL AND NATURAL HISTORY SOCIETY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates, and admits, by election, students from all departments of the University.

The collections of Chemical Preparations, and Botanical and Zoölogical Specimens belonging to the Society, are already important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures. Among the honorary members of the Society are more than one hundred of the most distinguished scientists in Europe and the United States.

THE ENGINEERING SOCIETY.

This Society was organized in 1873, and admits, by election, students in the Junior and Senior Classes. Its meetings are held monthly.

FOUNDER'S DAY.

On the second Thursday of October of each year Commemorative Exercises are held in honor of the Founder of the University.

On Thursday, October 8th, 1885, the Seventh Founder's Day was celebrated by laying the Corner-stone of the Memorial Church, which Mrs. Mary Packer Cummings is generously building for the University. The stone was laid with appropriate ceremony and service. Addresses were delivered by the Bishop of Pittsburgh, the Assistant Bishop of Central Pennsylvania, and the Bishop of Central Pennsylvania.

WASHINGTON'S BIRTHDAY.

This day is observed as a holiday and is usually celebrated by the students in an appropriate manner.

On Monday, February 23d, 1885, exercises were held in the Chapel. Washington's farewell address was read by Mr. Clapp, and orations were delivered by Messrs. R. Davis, Dean, C. A. Luckenbach, J. W. Richards, Richardson, Spengler, Taylor and H. Toulmin, of the Junior Class, and there was vocal music by the University Glee Club.

THE UNIVERSITY SERMON.

This sermon is preached on the Sunday before University Day.

The Rt. Rev. Nelson S. Rulison, D.D., Assistant Bishop of Central Pennsylvania was the preacher on Sunday, June 14th, 1885, in the University Chapel.

THESES.

Theses on the following subjects were prepared by the graduating class of 1885:

"The Separation of Nickel and Cobalt."

WARREN HOWARD ALLEN.

"The Theory and Probable Error of the Polar Planimeter."

HARRISON LINK AUCHMUTY.

"The Sewer in Gœpp and Main Streets, Bethlehem, Pa."

THEODORE WELD BIRNEY.

"Science, the Offspring of Modern Times, as exemplified by the Two Departments—Philology and International Law."

WILLIAM HARVEY COOKE.

"An Examination of Coal Dusts Relative to their Explosive Qualities."

HENRY BOWMAN DOUGLAS.

"Stadia Measurements."

WILLIAM NOBLE EDSON.

"The Water Supply of Lykens, Pa."

JOHN ROBERTS ENGLEBERT.

"Leveling by the Stadia."

FELIX FREYHOLD.

"A Description of the Plant of the Lehigh Zinc & Iron Company (Limited) for the Manufacture of Spiegeleisen, including a Determination of the Distribution of the Manganese."

JOHN ANDREW JARDINE.

"Design for an Iron Foundry, with an Estimate of Cost."

DAVID KIRK NICHOLSON.

"The Most Economical Depth of Bridge Trusses."

FAYETTE BROWN PETERSEN.

"A Formula for the Discharge of the Lehigh River at Bethlehem, Pa."

JOHN BERTSCH PRICE.

"An Inquiry into the Practicability of Roasting the 'Cuban Iron Ore.'"

FRANCIS HENRY PURNELL.

"A Balance Sheet of the Heat Received and Absorbed in a Blast Furnace."

ALFRED SCULL REEVES.

"The Design of a Passenger Locomotive Boiler."

HARRY WILLIAM ROWLEY.

"Design for a Dump and Pocket for Loading Iron Ores of High Specific Gravity and Hardness."

JOHN DOUGHERTY RUFF.

"The Stresses in the Piers of the Niagara River Cantilever Bridge."

ELLIOTT OTIS SMITH.

"Discussion of a Modification of a Westinghouse Air Brake."

CLARENCE MONCURE TOLMAN.

"Designing of Fixtures for the Automatic Safety Check of a Shive Governor."

JOHN WAGNER.

"The Water Supply of the Borough of Bethlehem."

JAMES HOLLIS WELLS.

THE ADDRESS BEFORE THE ALUMNI

was delivered on the evening of Alumni Day, June 17th, 1885, in the Drawing Room of Packer Hall, by Prof. C. L. Doolittle, C.E., of Bethlehem, Pa.

UNIVERSITY DAY.

This day is the last of the academic year and falls in 1886 on the fourth Thursday in June. On this day orations are delivered by members of the Graduating Class, and Degrees are conferred.

EXERCISES ON JUNE 18th, 1885.

Reading of Scriptures and Prayer by the Rt. Rev. M. A. De Wolfe Howe, D.D., LL.D., Bishop of the Diocese.

* Salutatory Oration.

WILLIAM HARVEY COOKE.

Oration.—"The Great Turning Point of English History."

WILLIAM HOWARD ALLEN.

Oration.—"Religious Toleration."

THEODORE WELD BIRNEY.

Oration.—"Elementary Education."

HARRY LUTHER BOWMAN.

Oration.—"The Socialistic Indictment."

HARRY WILLIAM ROWLEY.

Oration.—"The Mechanical Engineer."

JOHN WAGNER.

Oration.—"Retrospection."

JAMES HOLLIS WELLS.

* Oration, with the Valedictory Addresses.—"Science *vs.* Classics."

IRVING ANDREW HEIKES.

Award of the Wilbur Scholarship to
HARVEY SHEAFE FISHER,
of Pottsville, first in rank in the Sophomore Class.

Award of Certificates for the Advanced Course in Electricity.

---

* Of equal rank.

The Following Degrees were conferred:

B. A.

William Harvey Cooke.

C. E.

Harrison Link Auchmuty,
Theodore Weld Birney,
William Noble Edson,
John Roberts Englebert,
Felix Freyhold,
Fayette Brown Petersen,
John Bertsch Price,
Elliott Otis Smith,
James Hollis Wells.

M. E.

David Kirk Nicholson,
Harry William Rowley,
Clarence Moncure Tolman,
John Wagner.

B. M.

Harry Luther Bowman,
Irving Andrew Heikes,
Cabell Whitehead.

A. C.

Warren Howard Allen.

E. M.

Henry Bowman Douglas,
John Andrew Jardine,
Alfred Scull Reeves,
John Dougherty Ruff.

The Benediction was then pronounced by the Bishop.

The music upon University Day was by the Germania Orchestra.

THE WILBUR SCHOLARSHIP.

This Scholarship was founded in 1872 by E. P. Wilbur, Esq., of South Bethlehem, and is the sum of $200 awarded annually to the student in the Sophomore Class having the best record.

THE ALUMNI SCHOLARSHIP.

The Alumni Association of the University has established a Scholarship of the value of $250 per annum, subject to the following conditions:

1. That the Scholarship shall only be awarded to a student really in need of it.

2. That the Scholarship shall not apply to the first year of any student's course; he must without this aid have gone through one year, and must be prepared to start the second year free from all conditions.

3. That the Scholarship shall not be continued to a student who shall at any time during his course carry any condition over eight weeks beyond the date of the examination in which he failed.

Subject only to the above conditions the disposal of the fund shall until otherwise directed be in the hands of the President of the University.

ALUMNI PRIZES FOR ORATORY.

The "Alumni Association of the Lehigh University" has established an Annual Award of Fifty Dollars, as prizes for excellence in Oratory, subject to the following

REGULATIONS.

1. There shall be a FIRST PRIZE of *Thirty Dollars*, and a SECOND PRIZE of *Twenty Dollars*.

2. To entitle one to be a competitor, he must be a candidate for a degree, and his standing during the First Term of the Junior Year in Essays and Original Orations shall be at least 8.

3. The Executive Committee of the Alumni Association, or a committee of not fewer than three to be appointed by them, shall hear all competitors qualified to appear and the awards shall be made by a majority of these Judges.

4. The Orations shall be original and shall not exceed ten minutes in length, and shall be presented for examination at least fifteen days before the contest to the Professor of Rhetoric, who shall forward them with certificates of the eligibility of the competitors to to the Secretary of the Alumni Association.

5. In awarding the Prizes, the Judges shall consider the literary merits and the delivery of each Oration, but shall give greater weight to excellence in Elocution.

At the last contest, the First Prize was awarded to
CHARLES AUGUSTUS LUCKENBACH,
and the Second, to
WILLIAM PATTERSON TAYLOR.

The next contest will take place February 22d, 1886.

ENTRANCE EXAMINATION PAPERS,

Used at the Examinations in September, 1885.

[Requests for other examination papers than those herein printed cannot be granted.]

I.—ENGLISH GRAMMAR.

1. Write a sentence containing eight different parts of speech, and over each one of them write its name.

2. Write the plural of the following nouns: knife, lady, valley, sheaf, shelf.

3. Parse the following:

> I here declare those whom I did accuse
> Are innocent. 'Tis I alone am guilty.

4. Inflect throughout the pronouns of the first and the second persons.

5. Give the principal parts of the verbs *lie, lay, fly, flow, flee, draw, ride, thrive, set, sit, give.*

6. Name the relative pronouns. Write sentences in which each of them is correctly used.

7. Define and illustrate derivation and composition.

8. State the difference in use between *shall* and *will.*

9. Write six short sentences, each containing a verb in a different *tense* from the others. Underscore these verbs and write the name of the tense over it. Write four sentences with the four verbs in the four different *moods* and mark in the same way.

10. Justify or correct the following sentences:

a. If any one has been slighted, let them make it known.
b. I respect every man's judgment and follow my own.
c. Whom they suppose is doomed.
d. Texas is larger than any state in the Union.
e. Pitt was the pillar who upheld the state.
f. Our teacher told us that air had weight.

11. "God made the country and man made the town."

In the above line name the letters that are *liquids.* Which words contain diphthongs? Which words are dissyllables? What parts of speech are *not found* in it?

12. In the sentence: The crocodile is so difficult to kill outright that people are apt to imagine that the scales have resisted their bullets. Change "*the scales have resisted their bullets*" into the corresponding passive form.

13. Write four sentences: the first is to contain *who*, in the second person plural number; the second, *which*, singular number, objective case; the third, *whom*, masculine gender; the fourth, *that*, second person singular number.

14. What is the principal or leading clause in the sentence, "*In which predicament I say thou stand'st.*" Parse the verb in full in "*Thou hast incurred the danger.*"

15. Compare *bad, beautiful, heavy, many, ill, old,* and state the difference between adjectives and adverbs. Give the rule for the verb *strike* in the sentence, *Did you see him strike the boy?*

II.—GEOGRAPHY.

1. Bound lakes Erie and Ontario.
2. Describe the course of the Missouri River.
3. Name ten chief cities of the Southern States.
4. How far is Sitka from San Francisco, and in what direction?
5. Name the chief summer resorts of the Eastern and Middle States.
6. Name the empires, kingdoms, and republics of Europe.
7. Bound Afghanistan and Abyssinia.
8. Name the states of Central America, and indicate their relative positions.
9. Where are Belfast, Berne, Havana, Herat, and Khartoum?
10. Draw an outline map of the British Isles.

III.—UNITED STATES HISTORY.

1. Who were the first settlers of New Jersey? By whom was Delaware settled?

2. What were the Writs of Assistance? What was the Stamp Act? What were the results of these laws?

3. When did the battle of Bunker Hill take place? Who commanded on each side?

4. When did the evacuation of Boston take place?

5. What were the most important measures adopted by the advice of Alexander Hamilton? Who was Alexander Hamilton? Of which political party was he the leader? What was the name of the opposite party, and who was its leader?

6. Adams' Administration; what peculiar laws were passed? What were the difficulties with France?

7. When did the English come to Washington, and who were called the "Hartford Convention Federalists?"

8. What caused the expedition of John Brown? When and where did it take place?

9. When and where did the fight take place between the Monitor and the Merrimac?

10. Who decides as to the constitutionality of a law enacted by Congress?

11. Who declares war in the United States, and who makes peace?

IV.—PHYSICS.

Write each answer in a separate paragraph and prefix the number and letter of its question. The questions themselves need not be copied.

MECHANICS.

A reservoir is 200 ft. long, 50 ft. wide, and 20 ft. deep. What is the weight of water contained in it (the weight of a cubic ft. of water being taken as 62½ lbs.)? What is the pressure on the bottom? On each side? The total pressure?

2. If a body be thrown vertically upward with a velocity of 160 feet per second; then (the resistance of the air not being taken into account)—

a. How high will it go?

b. What will be its velocity half way up?

c. How long will it take to go up?

3. How long will it take an 80 ft. pendulum to vibrate?

SOUND.

4. What is meant by interference of sound?

5. On what does the intensity or loudness of sound depend?

6. Give the laws of the vibrations of strings.

LIGHT.

7. Where must a double convex lens be placed with reference to an object, to give a virtual image.

8. Name the parts of the eye which act as lenses.

9. Are the images made by the following instruments, real or virtual:

a. Convex lens. *b.* Concave lens. *c.* Convex mirror. *d.* Concave mirror.

10. Describe the Spectroscope and its use.

HEAT.

11. Explain latent heat.

12. What are the principal circumstances which influence the evaporation of water.

13. How may the specific heat of a body be found experimentally?

14. In how many ways can heat be transferred from one place to another?

ELECTRICITY.

15. What is local action in a battery, and what is the best means of preventing it?

16. Explain the construction and action of the Leyden Jar.

17. Give the parts (solid and liquid) of a Grove's cell and their arrangement.

18. On what does the electro-motive-force of a cell depend?

19. On what property of the voltaic current is the electric telegraph based?

20. Explain the construction and action of a galvanometer.

V.—GEOMETRY.*

1. The sum of all the angles of a triangle is equal to two right angles.

2. The three medial lines of a triangle meet in a point.

3. On a given line to describe a segment that shall contain a given angle.

4. If, through any point in the plane of a circle, a chord is drawn, the product of the segments made by the point is the same whatever the direction of the chord.

5. To find the locus of all the points whose distances from two

---

* This paper was supplemented by an ORAL examination.

given points are in a given ratio. Show what this locus becomes when the given ratio is unity.

6. Given two polygons to construct a third which shall be similar to one of the given polygons and equivalent to the other.

7. Of all plane figures having the same area the circle has the minimum perimeter.

8. Given the radius and apothem of a regular polygon to compute the radius and apothem of a regular isoperimetric polygon of double the number of sides.

9. Every point in the bisector of a diedral angle is equally distant from the sides.

10. The sum of any two face angles of a triedral angle is greater than the third.

VI.—ARITHMETIC.*

1. $[5\frac{2}{3} \times \frac{17}{12} \times \frac{3}{4} + 1.0176] \div [3\frac{3}{4} + 300.003] = ?$

2. 2 gallons, 3 qts., $1\frac{1}{3}$ pts. = how many litres?

3. What sum placed at simple interest for 3 yr. 10 mo. at seven per cent., will amount to the same as $1500.00 placed at compound interest for the same time at seven and one-half per cent.?

4. Find present worth of a note for $313.31 due in 2 yr. 2 mo. 2 days, at three and one-half per cent. discount.

5. At what price must a stock paying six per cent. dividend be bought to pay the same income as an eight per cent. stock at par?

6. A dealer paid $182 for 20 barrels of flour, giving $10 for first quality and $7 for second. How many barrels were there of each?

VII.—ALGEBRA.*

1. Find the factors of the following expressions:

$$1 - 2\sqrt{x} + x, \qquad c^6 - d^6, \qquad c^{-6} - d^{-6}.$$

2. $(a - b^2)^{\frac{1}{2}}$. Expand by the Binomial Formula.

3. 27983.251. Extract the square root and give the reasons for the various steps in the operation.

4. Reduce the following to equivalent forms having rational denominators:

$$\frac{x}{x + \sqrt{y}}, \qquad \frac{3}{\sqrt{5} + \sqrt{2}}, \qquad \frac{2}{\sqrt[3]{5} - \sqrt[3]{7}}.$$

---

* These papers were supplemented by an ORAL examination.

5. Solve the following equations:

$$\frac{1}{ab-ax}+\frac{1}{bc-bx}=\frac{1}{ac-ax},$$

$$\frac{8.5}{2}-\frac{.2}{x}=4\tfrac{1}{4}-\frac{1-.1x}{x}.$$

6. A man puts out $10,000.00 in two investments. For the first he gets five per cent. and for the second four per cent. The first yields annually $50 more than the second. What is each investment?

7. Derive formula for sum of a geometrical progression.

8. Solve the following equations:

$$3\sqrt{112-8x}=19+\sqrt{3x+7},$$

$$\left.\begin{aligned}x^2-4y^2&=9,\\ xy+2y^2&=3.\end{aligned}\right\}$$

VIII.—LATIN.

I.—GRAMMAR.

1. Decline throughout, with the adjective *nullus*, the following nouns: *homo, dies, exsul, opus, princeps.* What other words are declined like *nullus*?

2. Write the genitive singular of *frigus, virus, nemus, limen;* and the nominative singular of *salutem, sitim, litore, silicis, vulnera, aethere, sulcis.*

3. Compare *fortis, difficilis, parvus, miser.* Form and compare the corresponding adverbs. From what adjectives are *prudenter, acriter* and *parum* derived?

4. Distinguish *hic, iste* and *ille; quidam* and *quisquam.* When is the interrogative *quis* used, and when *qui?* Is there any difference between the inflection of *quis* (interrogative) and *quis* (indefinite)?

5. Discuss the meaning of each part of the word *aud-i-vi-m-us.*

6. What is a suffix, an affix, a radical, a stem, a root, an inflection? Explain the term "etymology."

7. Give the principal parts of the verbs from which the following forms are derived: *peteretur, alunt, praebent, perculsum, abiectum, canit.*

8. Write out in full the present tense of *volo, fio, fero, nolo, feror, prosum.* What is the derivation of *malo, possum, nolo?*

9. How do you distinguish between verbs of various conjugations? What is the conjugation of *cantare, canere, struere, stare, aperire, cupere, tenere, elicere, cumbere, sancire, inveterascere, crepare, fugere, ardere, metere, plorare?*

10. What is the gender of *manus, sermo, pes, compes, fraus, nubes, vannus, ratio?* Is this sentence correct: *Humus est humidus?* Give the reason for your answer.

II.—CAESAR.

Translate:

Ad haec Caesar, quae visum est, respondit; sed exitus fuit orationis: "Sibi nullam cum his amicitiam esse posse, si in Gallia remanerent; neque verum esse, qui suos fines tueri non potuerint, alienos occupare; neque ullos in Gallia vacare agros, qui dari, tantae praesertim multitudini, sine iniuria possint; sed licere, si velint, in Ubiorum finibus considere, quorum sint legati apud se et de Sueborum iniuriis querantur et a se auxilium petant; hoc se Ubiis imperaturum."—*B. G., IV., 8.*

Change the words of Caesar to direct discourse.

III.—VIRGIL.

Translate:

D. Vis ergo inter nos, quid possit uterque, vicissim
Experiamur? Ego hanc vitulam—ne forte recuses,
Bis venit ad mulctram, binos alit ubere fetus—
Depono: tu dic, mecum quo pignore certes.
M. De grege non ausim quicquam deponere tecum:
Est mihi namque domi pater, est iniusta noverca:
Bisque die numerant ambo pecus, alter et haedos.
Verum, id quod multo tute ipse fatebere maius,
Insanire libet quoniam tibi, pocula ponam
Fagina, caelatum divini opus Alcimedontis:
Lenta quibus torno facili superaddita vitis
Diffusos hedera vestit pallente corymbos. *Ecl., III., 28–39.*

1. In what sense does he use *vicissim?* 2. On what does *experiamur* depend? 3. Explain *ausim* and *domi.* 4. What is the grammatical antecedent of *quod* (line 8)? 5. Construction of *multo?* 6. Where did bucolic poetry originate?

Translate:

Ergo iter inceptum peragunt, fluvioque propinquant.
Navita quos iam inde ut Stygia prospexit ab unda
Per tacitum nemus ire pedemque advertere ripae,
Sic prior aggreditur dictis atque increpat ultro:
" Quisquis es, armatus qui nostra ad flumina tendis,
" Fare age, quid venias, iam istinc et comprime gressum.
" Umbrarum hic locus est, Somni Noctisque soporae;
" Corpora viva nefas Stygia vectare carina."

Aen., VI., 334–391.

1. What is the object of *prospexit?*
2. With what is *iam istinc* to be joined?
3. PROSODY:—*a.* Define the quantity of the final syllable of words of more than one syllable, and the quantity of words of one syllable.
   b. Divide the last four lines of this passage into feet and mark the rhythmic accent.
   c. Give the reasons for your division.

IV.—CICERO.

Translate:

Quae cum ita sint, Catilina, dubitas, si emori aequo animo non potes, abire in aliquas terras et vitam istam, multis suppliciis iustis debitisque ereptam, fugae solitudinique mandare? "Refer" inquis "ad senatum;" id enim postulas, et, si hic ordo sibi placere decreverit te ire in exsilium, obtemperaturum te esse dicis. Non referam, id quod abhorret a meis moribus, et tamen faciam ut intelligas, quid hi de te sentiat. Egredere ex urbe, Catilina, libera rempublicam metu, in exsilium, si hanc vocem expectas, proficiscere. Quid est, Catilina? Ecquid attendis, ecquid animadvertis horum silentium? Patiuntur, tacet. Quid exspectas auctoritatem loquentium, quorum voluntatem tacitorum perspicis?—*Cat. I., 8.*

Translate:

Municipiis dispertiri iubet. Habere videtur ista res iniquitatem, si imperare velis; difficultatem, si rogare. Decernatur tamen, si placet. Ego enim suscipiam, et ut spero, reperiam, qui id, quod salutis omnium causa statueritis, non putent esse suae dignitatis re-

cusare. Adiungit gravem poenam municipiis, si quis eorum vincula ruperit; horribiles custodias circumdat et digna scelere hominum perditorum Sancit ne quis eorum poenam, quos condemnat, aut per senatum aut per populum possit levare: eripit etiam spem, quae sola homines in miseriis consolari solet.—*Cat., IV., 4.*

1. Whose opinion is here stated? 2. Who proposed the opposing opinion and what was it?

V.—SIGHT READING.

Translate (Caesar, *B. G., VI., 18*) *:*

Galli se omnes ab Dite patre prognatos praedicant, idque ab Druidibus proditum dicunt. Ob eam causam spatia omnis temporis non numero dierum, sed noctium finiunt; dies natales et mensium et annorum initia sic observant, ut noctem dies subsequatur. In reliquis vitae institutis hoc fere ab reliquis differunt, quod suos liberos, nisi cum adoleverunt, ut munus militiae sustinere possint, palam ad se adire non patiuntur, filiumque puerili aetate in publico in conspectu patris adsistere turpe dicunt.

Translate (Cicero, *Epist., XIII., 28*)*:*

Hegeseratus Larissaeus magnis meis beneficiis ornatus in consulatu meo memor et gratus fuit, meque postea diligentissime coluit. Eum tibi magno opere commendo ut et hospitem meum et familiarem et gratum hominem et virum bonum et principem civitatis suae et tua necessitudine dignissimum. Pergratum mihi feceris, si dederis operam ut is intelligat hanc meam commendationem magnum apud te pondus habuisse.

VI.—COMPOSITION.

1. Caesar moves his camp, and in about fifteen days arrives at the boundaries of the Belgae. 2. I have lived in Rome, Carthage, Athens, Naples and Corinth: and have now been three years at home in Gaul. 3. I sent a man to Caesar, to tell him this. 4. When you come, I shall go away (*abeo*). 5. Cicero was six years older than Caesar. 6. This book will be of great value to us. 7. He said that this plan would be useful to all the states. 8. Let us ask them their

opinion in regard to this calamity. 9. The Germans were not ashamed of their valor. 10. Many states sent ambassadors to Rome to establish peace and friendship with the Roman people.

VII.—HISTORY.

1. Relate the traditions concerning the origin of Rome.
2. Describe the reign of Tarquinius Superbus.
3. Describe the causes and effects of the first secession.
4. Describe the conspiracy of Catiline.
5. Describe the decisive battles of Pharsalia, Philippi, and Actium.

IX.—GREEK.

Translate :—

Ἦν δέ τις ἐν τῇ στρατιᾷ Ξενοφῶν Ἀθηναῖος, ὃς οὔτε στρατηγός, οὔτε λοχαγός, οὔτε στρατιώτης ὢν συνηκολούθει, ἀλλὰ Πρόξενος αὐτὸν μετεπέμψατο οἴκοθεν, ξένος ὢν αρχαῖος· ὑπισχνεῖτο δὲ αὐτὸν, εἰ ἔλθοι, φίλον Κύρῳ ποιήσειν· ὃν αὐτὸς ἔφη κρείττω ἑαυτῷ νομίζειν τῆς πατρίδος. Ὁ μέντοι Ξενοφῶν, ἀναγνοὺς τὴν ἐπιστολήν, ἀνακοινοῦται Σωκράτει τῷ Ἀθηναίῳ περὶ τῆς πορείας, καὶ ὁ Σωκράτης ὑποπτεύσας, μή τι πρὸς τῆς πόλεώς οἱ ὑπαίτιον εἴη, Κύρῳ φίλον γενέσθαι, συμβουλεύει τῷ Ξενοφῶντι, ἐλθόντι εἰς Δελφοὺς, ἀνακοινῶσαι τῷ θεῷ περὶ τῆς πορείας.

Decline *τις, στρατιᾷ, ὅς, στρατηγός, στρατιώτης, ὤν, αὐτόν, κρείττω, πατρίδος, πόλεως.*

Compare *ἀρχαῖος, κρείττω, ἀγαθός, κακός, ταχύς, ἡδύς.*

Give the principal parts of *μετεπέμψατο, ποιήσειν, νομίζειν, ἀναγνούς, γενέσθαι.*

Give the following tenses in full: pres. subj. of *ἦν*; imperf. ind. act. of *συνηκολούθει*; fut. opt. mid. of *μετεπέμψατο*; aor. imperative act. of *ὑποπτεύσας.*

Case of *στρατιᾷ*; why? What part of speech is *ὅς*? Construction of *στρατηγός*. Parse *συνηκολούθει*; explain its form. Where is *μετετέμψατο* found? What is the force of the termination in *οἴκοθεν*? Tense of *ὑπισχνεῖτο*; what is the uncontracted form? Where is ἔλθοι found? Explain its mood. Construction of ποιήσειν, of νομίζειν. Why is πατρίδος gen.? Case of Σωκράτει; why? What cases does πρός govern? Parse οἱ. Why has πόλεως two accents? Mood of εἴη; why? Where is γενέσθαι found? its construction?

Translate:—

> Ὣς ἔφατ᾽· οὐδ᾽ ἄρα πώ οἱ ἐπεκραίαινε Κρονίων·
> ἀλλ᾽ ὅγε δέκτο μὲν ἱρά, πόνον δ᾽ ἀμέγαρτον ὄφελλεν.
> Αὐτὰρ ἐπεί ῥ᾽ εὔξαντο καὶ οὐλοχύτας προβάλοντο,
> αὐέρυσαν μὲν πρῶτα, καὶ ἔσφαζαν, καὶ ἔδειραν,
> μηρούς τ᾽ ἐξέταμον κατά τε κνίσῃ ἐκάλυψαν,
> δίπτυχα ποιήσαντες, ἐπ᾽ αὐτῶν δ᾽ ὠμοθέτησαν,
> καὶ τὰ μὲν ἂρ σχίζῃσιν ἀφύλλοισιν κατέκαιον,
> σπλάγχνα δ᾽ ἄρ᾽ ἀμπείραντες ὑπείρεχον Ἡφαίστοιο.

Why ὥς, and not ὡς? Where is ἔφατ᾽ found? why is its last syllable cut off? Parse οἱ; what effect does it have on the preceding word (πώ)? Where is ἐπεκραίαινε found? Parse δέκτο; what peculiarity in its form? Tense of ὄφελλεν; why is it unaugmented? Give the tense of προβάλοντο in full; what tense is it, and what verb is it from? What part of speech is πρῶτα? Principal parts of ἔσφαζαν. What is ἐξέταμον from, and what tense is it? Explain κατά. Why is κνίσῃ dat.? What cases does ἐπί govern? What part of speech is τά? What peculiarity in the forms σχίζῃσιν ἀφύλλοισιν? Tense and principal parts of κατέκαιον. Explain the form ἀμπείραντες. What would Ἡφαίστοιο be in Attic?

Sight Reading.

Ἐπεὶ δὲ ᾐσθάνετο ὁ Ξενοφῶν, ἔδοξεν ὡς τάχιστα ξυναγαγεῖν αὐτῶν ἀγοράν, καὶ μὴ ἐᾶσαι ξυλλεγῆναι αὐτομάτους· καὶ ἐκέλευσε τὸν κήρυκα ξυλλέγειν ἀγοράν. Οἱ δ᾽ ἐπει του κηρυκος ἠκουσαν, ξυνεδραμον και μαλα ἑτοιμως. Ἐνταυθα Ξενοφων των μεν στρατηγων οὐ κατηγορει, ὁτι ἠλθον προς αὐτον· λεγει δε ὡδε.

Write out the last two sentences in Greek, with the accents.

ALUMNI

OF THE

LEHIGH UNIVERSITY,

CLASS OF 1869.

J. H. H. Corbin, A.C., Resident Partner and Metallurgist, Mathews, Webb & Co., Ore and Bullion Dealers, Telluride, San Miguel Co., Col.

Charles E. Ronaldson, M.E., Engineer Siemen's Regenerative Gas Furnace, 1001 Chestnut Street, Philadelphia, Pa:

Miles Rock, C.E., Chief of the Boundary Commission of Guatemala with Mexico, San Jose, Guatemala.

CLASS OF 1870.

*L. Preston Ashmead, A.C., M.D.

Richard Brodhead, M.E., Attorney-at-law, 32 Nassau Street, New York City.

William R. Butler, M.E., Secretary and Treasurer Lehigh Stove and Manufacturing Co., Lehighton, Pa.

George A. Jenkins, A.C., Bethlehem Iron Co., Bethlehem, Pa.

William J. Kerr, A.C., 2037 Mount Vernon Street, Philadelphia.

*Harry E. Packer, A.C.

Harry R. Price, C.E., Mining Engineer, Pottsville, Pa.

Henry B. Reed, B.A., M.D., Practicing Physician, 2300 Delancy Place, Philadelphia, Pa.

William D. Ronaldson, B.A., M.D., Practicing Physician, 28 North 38th Street, Philadelphia, Pa.

John M. Thome, C.E., Director National Astronomical Observatory, Cordova, Argentine Republic.

*Russell B. Yates, C.E.

---

* Deceased.

CLASS OF 1871.

J. N. Barr, M.E., Mechanical Engineer, Chicago, Milwaukee & St. Paul R. R., Milwaukee, Wis.

Frank L. Clerc, C.E., Philipsberg, Center Co., Pa.

Henry S. Drinker, E.M., Attorney-at-Law, 218 South Fourth Street, Philadelphia, Pa.

Edward F. Fasset, A.C., 1530 Walnut Street, Philadelphia, Pa.

W. H. McCarthy, B.A., 283 George Street, corner College, New Haven, Conn.

Waldron Shapleigh, A.C., care of Graham Blandy, Esq., 62 Broadway, New York City.

*C. G. Weaver, C.E.

CLASS OF 1872.

George P. Bland, C.E., Civil Engineer, 3214 Woodland Avenue, Philadelphia, Pa.

D. P. Bruner, C.E., Attorney-at-Law, Harrisburg, Pa.

Henry St. L. Coppée, C.E., U. S. Assistant Engineer, Vicksburg Harbor Vicksburg, Miss.

F. R. C. Degenhart, A.C., Chemist, Havemeyer Sugar Refining Co., 112 Wall Street, New York City.

Harvey S. Houskeeper, B.A., Instructor in Physics, Lehigh University, South Bethlehem, Pa.

L. E. Klotz, C.E., Contractor for Crellin & Klotz, Mauch Chunk, Pa.

O. M. Lance, A.C., Superintendent Plymouth Water and Gas Companies, Plymouth, Luzerne Co., Pa.

R. Floresta de Miranda, C. E., Division Engineer, San Francisco R. R.. Province of Bahia, Brazil.

James S. Polhemus, C.E., U. S. Assistant Engineer, Harbor Improvements, Newport, Benton Co., Oregon.

Hon. H. D. Scudder, C.E., Hillman & Scudder, Lumber, Coal and Wood Dealers, Trenton, N. J.

CLASS OF 1873.

W. H. Baker, A.C., M.D., Professor of Obstetrics and Diseases of Women and Children, Philadelphia Polyclinic; 1610 Summer Street, Philadelphia, Pa.

* Deceased.

R. B. Claxton, C.E., Bank of North America, Philadelphia, Pa.

J. P. S. Lawrance, M.E., Passed Assistant Engineer, U. S. Navy, Office of Naval Intelligence, Bureau of Navigation, Navy Department, Washington, D. C.

H. C. de Miranda, A. C.,Professor of English, College of Para, Para, Brazil.

W. M. Scudder, M.E., Publisher *Newark Evening News*, 844 Broad Street, Newark, N. J.

CLASS OF 1874.

C. W. Haines, A.M., (Haverford), C.E., Astronomer, National Observatory, Cordova, Argentine Republic.

W. D. Hartshorne, C.E., Superintendent Arlington Mills, Lawrence, Mass.

Allen A. Herr, C.E., Civil Engineer, and Real Estate Agent, Lancaster, Pa.

Thomas Merritt, C.E., Morristown, N. J.

W. M. Rees, C.E., Engineer Corps, Government Improvement of Mississippi River, Memphis, Tenn.

CLASS OF 1875.

Charles J. Bechdolt, C.E., Supervisor, Monongahela Division P. R. R., Monongahela, Pa.

Antonio M. Cañadas, A.C., Chemist, Loja, Ecuador.

John F. Halbach, B.A., B.M., Music Teacher and Dealer in Music, Lehighton, Pa.

W. A. Lathrop, C.E., Superintendent Snow Shoe Division, L. V. Coal Co., Snow Shoe, Pa.

A. E. Meaker, C.E., Instructor in Mathematics, Lehigh University, Bethlehem, Pa.

Joseph Morrison, Jr., C.E., Teacher, Glendon, Northampton Co., Pa.

Francis S. Pecke, C.E., Contractor's Engineer and Superintendent, B. & O. R. R., Darley, Delaware Co., Pa.

E. H. Williams, Jr., B.A., (Yale) A.C., E.M., Professor of Mining and Geology, Lehigh University, Bethlehem, Pa.

*C. F. Zogbaum, C.E.

---

* Deceased.

CLASS OF 1876.

F. C. Angle, C.E., Attorney-at-Law, Danville, Pa.

J. D. Carson, C.E., General Manager, C. & R. I. R. R. Co., and Belt R. R. Co., Chicago, Ill.

T. W. Frederick, M.E., Master Mechanic N. Y., W. S. & B. R. R., Frankfort, N. Y.

William Griffith, C.E., Civil and Mining Engineer, Pittston, Pa.

C. W. MacFarlane, C.E., Superintendent Foundry, William Sellers & Co., Sixteenth and Hamilton Streets, Philadelphia, Pa.

R. W. Mahon, C.E., Ph.D., Chemical Manufacturer, 110 Arch Street, Camden, N. J.

J. J. de Malcher, M.E., Naval Officer, Custom House, Para, Brazil.

Col. W. P. Rice, C.E., U. S. Assistant Engineer, Chief of Engineers, Governor Hoadley's Staff, Cleveland, Ohio.

Henry Richards, E.M., Mining Engineer, Tebo Mine, Dover, N. J.

L. W. Richards, M.E., Superintendent of Steel Department, Chester Rolling Mills, Thurlow, Pa.

Charles L. Taylor, E.M., General Superintendent, Pittsburgh Bessemer Steel Co., (Limited), Pittsburgh, Pa.

CLASS OF 1877.

John Eagley, C.E., North Springfield, Erie Co., Pa.

Percival D. Geiss, C.E., Bethlehem, Pa.

Andrew M. Glassel, C.E., Bowling Green, Va.

George M. Heller, C.E., 853 North 20th Street, Philadelphia, Pa.

Henry S. Jacoby, C.E., Bookkeeper and Cashier, G. W. Jones & Co., 257 Main Street, Memphis, Tenn.

James F. Marstellar, C.E., Assistant Superintendent L. V. Coal Co., Snow Shoe Division, Snow Shoe, Pa.

Seizo Miyahara, C.E., Kagoshima, Japan.

Charles R. Rauch, A.C., Mining Operator, Bonanzo, Saguache Co., Col.

Lewis T. Wolle, C.E., Secretary and Treasurer Seiberling Mining Co., and Akron Straw Board Co., Akron, O.

CLASS OF 1878.

Charles Bull, M.E., New York City.

James E. Gilbert, C.E., Cashier First National Bank, Mitchell, Dakota.

Wm. Hazlett, M.E., Architect, 3 West 30th Street, New York City.

Frank P. Howe, B.A., (Brown) E.M., General Superintendent Montour Iron and Steel Co., Danville, Pa.

Nathaniel Lafon, Jr., M.E., Harrodsburg, Ky.

Benjamin B. Nostrand, Jr., M.E., U. S. Electric Lighting Co., 59 Liberty Street, New York City.

Milnor B. Paret, C.E., Assistant Engineer, in charge of Construction, Third Division, R. & P. R. R., Hamburg, Pa.

H. F. J. Porter, M.E., College Engineer, Columbia College School of Mines, New York City.

Wm. K. Randolph, C.E., P. S. V. R. R., Room 43, 233 South 4th Street, Philadelphia, Pa.

Robert H. Reed, B.A., Room 91, Division Electricity, U. S. Patent Office, Washington, D. C.

Henry C. Wilson, C.E., Chief Clerk and Consulting Engineer U. S. Engineer's Office, Memphis, Tenn.

CLASS OF 1879.

J. S. Cunningham, M.E., Mining Engineer Everett Iron Co., Everett, Pa.

J. H. Paddock, M.E., Paddock & Bowman, Engineers, Connellsville, Penna.

F. W. Sargent, C.E., Engineer of Tests, Chicago, Burlington & Quincy R. R., Aurora, Ill.

R. H. Tucker, C.E., Assistant Astronomer, National Astronomical Observatory, Cordova, Argentine Republic.

CLASS OF 1880.

Abram Bruner, E.M., Assistant Engineer, Superintendent's Office, Eastern Division, Pa. Co., Allegheny, Pa.

Murray Morris Duncan, A.C., E.M., Superintendent Roane Iron Co., Rockwood, Tenn.

Thomas Hughlett Hardcastle, B.A. (M.A., '82), LL.B., Attorney-at-Law, Easton, Md.

John Tinsley Jeter, E.M., Mining Engineer, L. V. Coal Co., Wilkesbarre, Pa.

Charles Francis King, A.C., Chemist, Penn. Steel Co., Steelton, Pa.

George Ernest Potter, C.E., Division Engineer, M. & O. Railway, Hanover, Mich.

Fred. Putnam Spalding, C.E., Engineer and Contractor, Room No. 2 Cotton Exchange, Memphis, Tenn.

Leonard Blakslee Treharne, B.A., Tutor in Mathematics, Berkeley School, 13 Tremont Street, Boston, Mass.

Benjamin Russel Van Kirk, M.E., Draftsman, Baldwin Locomotive Works, Philadelphia, Pa.

*Frederic Copeland Wooten, M.E.

CLASS OF 1881.

William Simon Cranz, A.C., Analytical Chemist, Tucson, Arizona.

Alexander Patrick Crilly, B.A., Attorney-at-Law, and City Solicitor, 540 Hamilton Street, Allentown, Pa.

Thomas Morgan Eynon, Jr., M.E., Instructor in Mechanical Engineering, Lehigh University, Bethlehem, Pa.

Charles Weed Gray, A.C., care of Abram Bruner, Esq., Superintendent's Office, Eastern Division, Pa. Co., Allegheny, Pa.

Benjamin Franklin Haldeman, E.M., Chemist, Cambria Iron Co., Johnstown, Pa.

Lewis Stockton, B.A., Student-at-Law, with Bissel, Sicard & Goodyear, Attorneys-at-Law, Buffalo, N. Y.

CLASS OF 1882.

Louis Oscar Emmerich, E.M., Lehigh & Wilkesbarre Coal Co., Audenried, Pa.

Charles Comstock Hopkins, B.S. (C.E., '84), with Chas. W. Knight, C.E., Rome, N. Y.

Elmer Henry Lawall, C.E., Engineer, Beaver Brook Estate, Audenried, Pa.

Robert Thomas Morrow, Jr., C.E., Supervisor and Assistant Train Master, Lewisburg & Tyrone R. R., a Division of the Pennsylvania R. R., Lewisburg, Pa.

Eugene Ricksecker, C.E., Topographer in charge U. S. Geological Survey, Washington, D. C.

John Dougherty Ruff, E.M., 1523 Spruce Street, Philadelphia, Pa.

*Samuel Brenton Sickler, C.E.

Martin Wittmer, E.M., Etna, Allegheny Co., Pa.

---

* Deceased.

CLASS OF 1883.

Enos Kellar Bachman, E.M., Instructor in Mining and Metallurgy, Lehigh University, Bethlehem, Pa.

Walter Briggs, B.A., Student-at-Law, 1020 Scranton Street, Scranton, Pa.

Harry Augustus Butler, B.S., General Bookkeeper, First National Bank, Mauch Chunk, Pa.

Hedley Vicars Cooke, B.A., U. S. Civil Service, Pension Office, Washington, D. C.

Francis Joseph Crilly, B.A., Clerk, U. S. Custom House, Philadelphia, Pa.

Francis Wharton Dalrymple, C.E., Division Engineer, Delaware Division N. Y. L. E. & W. R. R., Port Jervis, N. Y.

Timothy James Donahue, A.C., Chemist, Bethlehem Iron Co., South Bethlehem, Pa.

George Francis Duck, E.M., 50 Downing Street, Brooklyn, N. Y.

Alfred Edmund Forstall, M.E., Assistant to General Manager Chicago Gas Light and Coke Co., Chicago, Ill.

Nathaniel Oliver Goldsmith, M.E., Weir Frog Co., Cincinnati, O.

William Theodore Goodnow, C.E., Brown and Goodnow, Engineers and Contractors, Bethlehem, Pa.

John Daniel Hoffman, B.A., Law Student, Bethlehem, Pa.

George Gowen Hood, C.E., P. & R. R. R. Engineer Corps, 413 Walnut Street, Philadelphia, Pa.

Garret Linderman Hoppes, C.E., Bethlehem, Pa.

Julian de Bruyn Kops, B.E., C.E., Chicago Telephone Co., Chicago, Ill.

Preston Albert Lambert, B.A., Instructor in Mathematics, Lehigh University, South Bethlehem, Pa.

Edwin Francis Miller, M.E., Baldwin Locomotive Works, 1642 Green Street, Philadelphia, Pa.

Wilson Franklin More, B.A., Theological Seminary, 117 North Main Street, Lancaster, Pa.

Nelson Morrow, M.E., 54 East Utica Street, Oswego, N. Y.

Thomas Nicholson, Jr., M.E., Assistant Engineer, Wharton R. R. Switch Co., Jenkintown, Pa.

George Spencer Patterson, E.M., Engineer, Union Improvement Co., Jeddo, Luzerne Co., Pa.

Richard Rembrandt Peale, B.S., Student-at-Law, Lock Haven, Pa.

Henry Allebach. Porterfield, E.M., Assistant Engineer of Tests, Cambria Iron Co., Johnstown, Pa.

Francis Henry Purnell, C.E., Berlin, Md.

Jesse Wilfred Reno, E.M., Laboratory of Pueblo Smelting and Refining Co.. Pueblo, Col.

Charles Loomis Rogers, M.E., Engineer, N. Y. C. & H. R. R. R. Room 14, Grand Central Depot, New York City.

John Ruddle, M.E., Registrar Fidelity Insurance, Trust and Safe Deposit Co., Philadelphia, Pa.

Charles Henry Stinson, B.S., Student-at-Law, Norristown, Pa.

*Robert Stinson, B.S.

CLASS OF 1884.

Robert Grier Cooke, B.A., Principal Preparatory Class, Moravian Parochial School, Bethlehem, Pa.

Henry Bowman Douglas, E.M., Mining Engineer, Humboldt and East Sugar Loaf Collieries, Stockton, Pa.

William Banks Foote, B.M., Rochester, N. Y.

Harry Tallman Harper, C.E., Tower City, Pa.

Harry Hurd Hillegass, C.E., Reading, Pa.

Edwin Franklin Hofford, C.E., Lehighton, Pa.

John Andrew Jardine, E.M., Assistant Superintendent, in charge of Blast Furnaces, Monto Alto Iron Co., Franklin Co., Pa.

James Warner Kellogg, M.E., care of Allis & Co., Milwaukee, Wis.

David Garrett Kerr, B.M., Edgar Thompson Steel Works, Bessemer, Pa.

William Langston, C.E., 552 Lafayette Avenue, Brooklyn, N. Y.

Robert Packer Linderman, Ph.B., Linderman and Skeer, Coal Operators, Bethlehem, Pa.

Joseph Franklin Merkle, C.E., State Geological Survey, Scranton, Pa.

Harry Krider Myers, C.E., Resident Engineer, Houtz Heirs' Estate, Houtsdale, Pa.

Albino Rosendo Nuncio, M.E., with Davilla Manufacturing Co., Saltillo, Mexico.

James Ward Packard, M.E., Sawyer-Mann Illuminating Co., 32 Nassau Street, New York City.

Alfred Scull Reeves, E.M., Tubal Smelting Works, 760 and 762 South Broad Street, Philadelphia, Pa.

* Deceased.

Barry Searle, A.C., Chemist, Pennsylvania Steel Co., Steelton, Pa.
Lewis Buckley Semple, B.A., Teacher of Mathematics, Diocesan School, Reading, Pa.
Augustus Parker Smith, M.E., Editorial Staff, *New York Daily Tribune*, Tribune Building, New York City.
Murray Stewart, M.E., 404 Penn Street, Reading, Pa.
Richard Washington Walker, C.E., Mexican Boundary Commission, San Jose, Guatemala.
James Angus Watson, C.E., Pennsylvania R. R. Engineer's Office, Sunbury, Pa.

CLASS OF 1885.

Warren Howard Allen, A.C., Athens, Pa.
Harrison Link Auchmuty, C.E., Millersburg, Pa.
Theodore Weld Birney, C.E., Law Student, Washington, D. C.
Harry Luther Bowman, B.M., Penna. Steel Co., Steelton, Pa.
William Harvey Cooke, B.A., Medical Student, Boston, Mass.
William Noble Edson, C.E., Clifton Springs, N. Y.
John Roberts Engelbert, C.E., Wiconisco, Pa.
Felix Freyhold, C.E., U. S. Geological Survey, 236 First Street, S. E., Washington, D. C.
Irving Andrew Heikes, B.M., Lehigh University, Bethlehem, Pa.
David Kirk Nicholson, M.E., Baldwin Locomotive Works, Phila., Pa.
Fayette Brown Petersen, C.E., Eng'r Water Works, Washington, D. C.
John Bertsch Price, C.E., Mauch Chunk, Pa.
Harry William Rowley, M.E., Draughtsman, South Bethlehem, Pa.
Elliot Otis Smith, C.E., Maurice & Kellogg Bridge Works, Athens, Pa.
Clarence Moncure Tolman, M.E., Engineer, Armington & Sims' Engine Co., 38 Carpenter Street, Providence, R. I.
John Wagner, M.E., Coxe Bros. & Co., Drifton, Pa.
James Hollis Wells, C.E., Teacher, Excelsior High School, South Bethlehem, Pa.
Cabell Whitehead, B.M., Amherst, Va.

The number of Graduates is 178, of whom there are 19 who have taken the Degree of B.A.; 1 of Ph.B.; 4 of B.S.; 74 C.E.; 35 of M.E.; 18 of E.M.; 19 of A.C.; 5 of B.M.; 2 who have taken the two degrees of A.C. and E.M.; and 1 who has taken both B.S. and C.E.

OFFICERS OF THE ALUMNI ASSOCIATION OF THE LEHIGH UNIVERSITY.

1885-1886.

President:

PROF. E. H. WILLIAMS, JR., Bethlehem, Pa.

Vice-President:

G. A. JENKINS, Bethlehem, Pa.
C. C. HOPKINS, Rome, N. Y.

Secretary and Treasurer:

CHARLES BULL, P. O. Box 433, New York City.

Alumni Trustees:

CHARLES L. TAYLOR, Pittsburg, Pa.
(Term expires June, 1886.)

W. R. BUTLER, Mauch Chunk, Pa.
(Term expires June, 1887.)

H. F. J. PORTER, New York City.
(Term expires June, 1888.)

J. S. CUNNINGHAM, Everett, Pa.
(Term expires June, 1889.)

Executive Committee:

PROF. E. H. WILLIAMS, JR., *Chairman*,
CHAS. L. TAYLOR,
H. F. J. PORTER,
W. R. BUTLER,
J. S. CUNNINGHAM,
CHARLES BULL.

ASSOCIATE MEMBERS OF THE ALUMNI ASSOCIATION.

Samuel P. Sadtler, Ph.D., F.C.S., Professor of General and Organic Chemistry, University of Pennsylvania, Philadelphia, Pa.

*Milton Dimmick, '70, Philadelphia, Pa.

E. Warren Sturdevant, '75, Attorney-at-Law, Wilkesbarre, Pa.

* Deceased.

LIST OF DONATIONS
TO THE
VARIOUS DEPARTMENTS
OF
THE LEHIGH UNIVERSITY.

DONATIONS TO THE LIBRARY.

From Hon. Wm. Mutchler, Easton, Pa.

Report of the Commissioners of Education, 1882–83.
Smithsonian Report, 1882.
Tariff Compilation, 1884.
War of the Rebellion, Official Records, Vol. 11, Part 3.
United States Geological Survey, Third Annual Report.
Statutes of the United States, First Session, Forty-eighth Congress.
War Department, 1884. Vol. 4, 1881–82.
War Department, 1884. Vol. 4, Parts 1 and 2, 1882–83.
Navy Department, 1882–83.
Official Records of the War of the Rebellion. Series 1. Vol. 12. Parts 1, 2 and 3.
Official Records of the War of the Rebellion. Series 1. Vol. 13.

From Hon. J. D. Cameron, Harrisburg, Pa.

Official Records of the War of the Rebellion. Series 1. Vol. 12. Parts 1, 2 and 3.
Official Records of the War of the Rebellion. Series 1. Vol. 13.

From Hon. John W. Mitchell.

Messages and Documents, 1882 and 1883, Abridgments.
Messages and Documents, 1883 and 1884, Abridgments.
Tariff Compilation, 1883 and 1884.

From the Trustees of the Peabody Institute of the City of Baltimore, Md.

Catalogue of the Library, Part 2, D–G.

From J. M. Forster, Insurance Commissioner, Harrisburg, Pa.

Twelfth Annual Report, Parts 1 and 2.

From the United States War Department, Washington, D. C.

Official Army Register, January, 1885.
Report of the Chief Signal Officer, 1883.
Report of the Chief Signal Officer, 1884.
Signal Service Notes, Nos. 6, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 22.
Professional Papers, No. 16. Tornado Studies for 1884.
Researches on Solar Heat, by Langley.
Enquiète sur les Moyens de Prevenir les Accidents de Chemins de Fer, 1879–1880.
Index Catalogue of the Library of the Surgeon General's Office. United States Army. Vols. 1, 2, 3, 4, 5, 6.
Synonyms of Volunteer Organizations of the United States.

From the United States Navy Department, Washington, D. C.

Navy Professional Papers, No. 17. Magnetism of Iron and Steel Ships.
Navy Professional Papers, No. 18. Training of Enlisted Men.
Report of United States Naval Observatory. 1884.
Washington Astronomical and Meteorological Observations. 1881. Vol. 28.
The American Ephemeris and Nautical Almanac. 1887.
The American Ephemeris and Nautical Almanac. 1888.

Reports of Observations of the Total Eclipse of the Sun, August 7, 1869, by Prof. J. M. C. Coffin.

Telegraphic Determination of Longitudes in Mexico and Central America, and on the West Coast of South America. 1883–1884.

From the United States Treasury Department.

Report of the Treasurer. 1884.

Statement of the Public Debt of the United States for the Month of August, 1885.

From Dr. J. P. Kimball, Director of the Mint.

Report of the Director of the Mint upon the Statistics of Production of Precious Metals in the United States. 1880, '81, '82, '83, '84.

Annual Report of the Director of the Mint for 1885.

On the Iron Ores of the Juaragua Hills, Santiago, Cuba.

From the Department of the Interior.

Public Documents, nine volumes and one pamphlet. 1884.

Public Documents, twenty-two volumes. 1885.

United States Official Register. 1871, '73 and '75.

Circulars of Information. Bureau of Education. 1884. Nos. 4, 5, 6, 7.

Circulars of Information. Bureau of Education. 1885. Nos. 1 and 2.

Historical Sketches of the Universities and Colleges of the United States.

International Educational Congress at Havre.

Planting Trees in School Grounds and the Celebration of Arbor Day.

Tertiary Vertebrata, by E. D. Cope. Heyden's Survey. Vol. 3.

The Cretaceous and Tertiary Flores, by Lasquereux. Vol. 8.

From the Boston Public Library.

Thirty-Third Annual Report. 1885.

"Bulletin." Winter Number. 1885.

From the Canadian Geological and Natural History Survey. Alfred R. C. Selwyn, LL.D., F.R.S., Director, Ottawa, Canada.

Comparative Vocabulary of the Indian Tribes of British Columbia.

Catalogue of Canadian Plants. Part 2.—Gamopetalae, by John Macoun.

Report of Progress. 1882–'83–'84.

Report of Progress. 1882–'84. Maps, etc.

Descriptive Sketch of Physical Geography of Canada and Maps.

From the American Institute of Mining Engineers New York City.

Transactions. Vol. 13.

From the American Society of Mechanical Engineers, New York City.

Transactions. Vol. 4. 1883.

Transactions. Vol. 5. 1884. And Index to Vols. 1–5.

From Hon. H. W. Blair, New Hampshire.

Investigations of the Senate Committee on Education and Labor, four volumes.

From the Smithsonian Institution, Washington, D. C.

Addresses at the Unveiling of the Joseph Henry Statue. Smithsonian Contributions to Knowledge. Vols. 24 and 25. Publications of the Bureau of Ethnology, by J. W. Powell.

Second Annual Report. 1880–'81.

Smithsonian Report. 1883.

A Catalogue of Scientific and Technical Periodicals (1665 to 1882), by H. C. Bolton.

Circular relative to Contributions of Aboriginal Antiquities to the United States National Museum, by Charles Rau.

From the Astronomical Observatory of Harvard College.

Annals. Vol. 14. Part 2.

From the Department of Internal Affairs, Harrisburg, Pa

A Geological Hand Atlas of the Sixty-seven Counties.
Atlas of the Northern Anthracite Field. Part 1.
Cameron, Elk and Forest Counties. Part 2.
Perry County. Part 1.
Report of the Coal Mines of the Monongahela River Region.
Reports AA, H_7, P_1 Vol. 3, P_3, RR_8, atlas, T_4, Z.
Grand Atlas, Division 1, County Geological Maps. Part 1. 1885. Division 2. Part 1.

From Charles A. Ashburner.

Brief Description of the Anthracite Coal Fields of Pennsylvania.
Sketch of the Geology of Carbon County, Pa.

From L. J. Morris, Emporia, Kansas.

Action of the Halogen Acids and Ammonia on Lactones.

From the Argentine National Observatory, Cordoba.

Resoltados. Vols. 3 and 4.
Catálogo de las Zonas. Vols. 7 and 8.
Annales de la Officina Meteorológica Argentina, by B. A. Gould.

From Hon. Jeremiah S. Hess, Hellertown, Pa.

Report of Inspectors of Mines. 1882.

From Hon. Samuel A. Green, Boston.

Memorial of John Harvard.
The Channing Home, Reports Nos. 16 and 17.
The Necrology of Harvard College, 1869–1872.
Remarks on Library Construction, by William F. Poole.
Cavo de Baxos, or the Place of Cape Cod in the Old Cartology, by B. F. De Costa.
A Catalogue of the Paintings, Engravings, Busts, etc., belonging to the Cabinet of the Massachusetts Historical Society.

Catalogue of the Groton Public Library at Groton, Mass. 1885.

Eulogy on the Life and Character of John Quincy Adams, by Edward Everett.

Letters of Columbus and Vespuccius.

Journal of Thomas Wallcut in 1790, by George Dexter.

From E. Coppée Mitchell, Phila., Pa.

Law, Its Nature and Office as the Bond and Basis of Civil Society.

From the Board of Directors of the Brooklyn Library.

The Twenty-seventh Annual Report for 1885.

Fifteen Annual Reports.

From the Board of Regents of the University of Minnesota, Minn.

The Geological and Natural History Survey of Minnesota, 1872–1882, Vol. 1.

From the Institution of Civil Engineers, London.

Minutes of Proceedings, Name Index. Vols. 1–58.

Minutes of Proceedings. Vols. 79, 80, 81, 82.

Institution of Engineers, Charter, By-Laws and List of Members, June 3, 1885.

Heat in its Mechanical Applications, Session 1883–84.

From Edward H. Chase, Wilkes-Barre.

Report of Commissioners of Internal Revenue. 1884.

From Thos. W. Wright, C.E.

Annual Report of the Mississippi River Commission. 1884.

From Hon. David Mumma, Harrisburg, Pa.

Centennial Memorial of the Founding of Schoop's Church, Lower Paxton Township.

From the American Iron and Steel Association, Philadelphia, Pa.

Statistics of the American and Foreign Iron Trades for 1884.

Annual Report of the Secretary, George W. Cope.

A Bird's-Eye View of the Production and Characteristics of Iron Ores in the United States, by James M. Swank.

The Question of Tariff Revision, A Letter from the American Iron and Steel Association.

From the State Library of Massachusetts.

Report of the Librarian for the year ending September 30, 1884.

From Dr. E. H. S. Bailey, Lawrence, Kansas.

Fourth Biennal Report of the State Board of Agriculture of Kansas. Vol. 9.

Kansas Horticultural Report for the Year 1884. Vol. 14.

Transactions of the Kansas Academy of Science. Vol. 9. 1883–84.

From the Harvard College Library.

The Harvard University Bulletin. Nos. 30, 31, 32.

From John M. Gregory, Washington, D. C.

Second Annual Report of the United States Civil Service Commission for 1884.

From W. D. Hildrup, Harrisburg, Pa.

History of the Harrisburg Car Manufacturing Co.

Fvom Samuel C. Perkins, Esq.

Report of the Commissioners for the Erection of Public Buildings.

From the Chamber of Commerce, Pittsburgh, Pa.

Map of Pittsburgh and Western Pennsylvania Coal and Coke Fields.

From the U. S. Coast and Geodetic Survey Office, Washington. D. C.

Report for 1883.

From W. B Hackenborg, 20 N. Third Street, Philadelphia.

Seventeen Reports of Jewish Hospital Association of Philadelphia.
Programme of the Laying of the Corner Stone of Jewish Hospital.
The Golden Book of Life.
Statistics of the Jews of the United States.
Catalogue of the Leeser Library.

From the Bethlehem Iron Company.

Description of the Works.

From M. E. Olmsted, Harrisburg, Pa.

Address of Georges d'Infrevilleville, Electrician.

Address of Mr. Henry Bently.

Argument of Wager Swayne on Behalf of the Western Union Telegraph Company.

Arguments of Mr. John R. Read on Behalf of the Western Union Telegraph Company. Feb. 27, 1885, and March 31, 1885.

Argument of Mr. John Dalzell.

Address of Mr. Willard Brown.

From Julius D. Dreber, Salem, Va.

Salem and the Roanoke Valley.

From John Fanshawe, Sec. L. V. R. R. Co., Philadelphia.

Remarks of Mr. G. B. Roberts before the Judiciary General Committee of the Senate of Pennsylvania on the Anti-Discrimination Bill.

Remarks of Mr. John Scott on the Same Bill.

Arguments of Cyrus Elder, Esq., Welty McCullough, Esq., and others on the Same Bill.

Arguments of A. J. Herr, Esq., J. D. Hancock, Esq., and Mr. Locke upon the Same Bill.

Argument of Mr. M. E. Olmsted upon the Same Bill.

Argument of Mr. John P. Green upon the Same Bill.

From C. P. Pollak, St. Louis, Mo.

Meteorology of the Mountains and Plains of North America. As Affecting the Cattle Growing Industries of the United States. An Address by Silas Bent.

Gateways to the Pole, by Silas Bent.

The Isthmian Ocean—Highway of America: The Tehuantepec Ship-Railway, by Silas Bent.

From W. J. Linton, New Haven, Conn.

Who Spoils our New English Books, by Henry Stevens.

From Dr. R. A. Lamberton.

Orations of Hon. Robt. C. Winthrop and Hon. John W. Daniel, delivered at the Dedication of the Washington Monument.

Theology of Nature and Revelation by an Amateur Theologian.

Annual Report of the Board of Visitors to the United States Military Academy for the year 1885.

Historical Societies in their Relation to Local Historical Interest by the Rt. Rev. C. F. Robertson.

From Prof. F. M. Bird.

The Doctrines and Discipline of the Methodist Episcopal Church. 1864.

Hymns for the Use of the Methodist Episcopal Church.

The Book of Psalms in Blank Verse with Practical Reflections by John Eden.

Thirty-five Miscellaneous Books.

From the Executors of the Estate of the Late J. W. Maynard, Williamsport.

Four Hundred and Forty-three Volumes, mostly law books.

Three Hundred and Seventy-three Pamphlets.

Marble bust of Hon. J. W. Maynard, with pedestal.

From Prof. E. H. Williams.

Fifty-four Pamphlets.

From Asa Jones, Flemington, N. J.

"The Scientific American." Vols. 48 and 49. 1883.

From the Authors.

Science and the Supernatural. Prof. A. J. Dubois, New Haven, Conn.

Argument in Opposition to the Passage of the Underground Wire Bill. M. E. Olmsted, March 24, 1885.

Argument in Behalf of the Western Union Telegraph Company, March 26, 1885. M. E. Olmsted.

An Easter Study in St. Peter. Rev. Samuel Fuller, D.D.

Nomenclature of Cities and Towns in the United States. D. D. Field.

The Attempts Made to Separate the West from the American Union. Rt. Rev. C. F. Robertson, D.D., LL.D.

The American Revolution and the Acquisition of the Valley of the Mississippi. Rt. Rev. C. F. Robertson, D.D., LL.D.

The Agricola and Germania of Tacitus. Prof. Henry C. Johnson, A.M., LL.B.

The Works of Virgil. Prof. Henry C. Johnson, A.M., LL.B., joint Editor with Prof. Edward Searing, M.A.

Life and Writings of V. L. Bradford. H. E. Dwight, M.D., D.D.

New Zealand, Her Commerce and Resources. G. W. Griffin.

Notes on the Opium Habit. Asa P. Mylert, M.D.

Historical Sketch of the Borough of South Bethlehem. J. D. Brodhead, Esq.

A Great Trap Dyke Across Southeastern Pennsylvania. H. Carvill Lewis.

Explorations of the Aboriginal Remains of Tennessee. Joseph Jones, M.D.

Remarks on the Early Appearance of the Northern Lights in New England. S. A. Green, M.D.

On Mr. Spencer's Data of Ethics. Malcolm Guthrie, Liverpool, England.

On Mr. Spencer's Unification of Knowledge. Malcolm Guthrie, Liverpool, England.

Law, Its Nature and Office, as the Bond and Basis of Civil Society. By E. Coppée Mitchell, Philadelphia.

A Review of the Atlas of the Western Middle Anthracite Field. B. S. Lyman.

Marginal Kames. H. Carvill Lewis.

From the Publishers.

"The Bethlehem Daily Times."
"Bonfort's Wine and Spirit Circular." Vols. 22, 23 and 24.
"The Catasauqua Dispatch."
"The Evening Telegraph." Philadelphia, Pa.
"The Moravian."
"The Iron Age."
"Bulletin of the Iron and Steel Association."
"The Mauch Chunk Democrat."
"The Epitome." Vol. 11.
"The South Bethlehem Daily Star."

From the Hon. W. H. Sowden, Allentown, Pa.

Bulletin of the U. S. Fish Commission. Vol. 2. 1882. Vol. 4. 1884.
Commercial Relations. Vols. 1, 2. 1882, 1883.
Message and Documents. 1883–4. Abridgment.
Annual Report of the Bureau of Ethnology. 1880–1.
First Comptroller's Decisions. Lawrence. Vols. 4, 5, 6.
Propagation, etc., of Food Fishes of U. S. 1882. Part 10.
Report of the National Academy of Sciences. 1883.
Finance Report. 1884.
Report of the Geological Survey. 1882–3.
Report of the Geological Survey. Vol. 3. 1882–3. 1883–4.
Report of the Eclipse Expedition to the Caroline Islands.
Congressional Records. Vol. 16. Part 1, 2, 3.
Congressional Special Session of Senate. 1881.
Report of Secretary of War. Vol. 1. 1884–5.
Internal Commerce of the United States. 1882.

TO THE DEPARTMENT OF CIVIL ENGINEERING.

From G. P. R. Stearns, C.E.

Model of a Swing Bridge with Automatic Signals.

From Prof. J. A. L. Waddell, Tokio, Japan.

Blue Print Bridge Drawing.

From the Phœnix Bridge Company, Phœnixville, Pa.

10 Photo-collotypte Prints of Bridges.
Pocket Book of Useful Information.
Album of Bridge Designs.

From Selmar Siebert, Washington, D. C.

Topographical Map of Germany.

From the Berlin Iron Bridge Company, East Berlin, Conn.

17 Prints of Bridges.
5 Photographs of Bridges.
16 Prints of Designs for Plate Girders.

From Samuel M. Grey, C.E., Providence, R. I.

8 Copies of Report on the Sewerage of Providence.

From the Union Bridge Company, Buffalo, N. Y.

3 Blue Prints of Details of the Niagara Cantilever Bridge.

From John McArthur, Jr., Philadelphia, Pa.

Phototype of the Philadelphia City Hall.

From C. A. Junken, Washington, D. C.

Photograph of the Cabin John Stone Arch.

From N. O. Goldsmith, M.E., Cincinnati, O.

3 Blue Prints of Frogs, Switches and Crossings.

From Eugene Ricksecker, C.E., Washington, D. C.

Contour Map of Mt. Shasta, California.

From the Chief of Engineers, U. S. A.

A set of Detailed Drawings and Views of St. Mary's Falls, Canal and Locks, Michigan.

From Robert H. Sayre, Esq., South Bethlehem, Pa.

Map of Division IV. of the South Pennsylvania Railroad.

TO THE DEPARTMENT OF MECHANICAL ENGINEERING.

Apparatus, Samples, etc.

Billings & Spencer, Hartford, Conn., Samples of Drop Forgings.

H. Belfield & Co., Philadelphia, Steam Gauge (sectioned).

Cleveland Twist Drill Company, Cleveland, Ohio, one set of Twist Drills (29 pieces), one inch Rose Chucking Reamer, 11-16 inch Expansion Reamer, $\frac{7}{8}$ inch Hand Reamer, one set of Master Taps, one Milling Cutter.

George V. Cresson, Philadelphia, Hangers and Couplings.

R. Dudgeon, New York City, one two-inch Expander and sample of work.

Hancock Inspirator Company, Boston, No. 6 Inspirator (sectioned).

Hoopes & Townsend, Philadelphia, 17 samples of Case-hardened Nuts, 17 samples of Bolts and their Nuts, 12 samples of Rivet Forgings 2 Samples of Machine-riveted Boiler-plate Joints, samples cold-punched Nuts (sectioned), samples of Fractured and Bent Bolts and Rivets.

Jenkin Bros., New York City, Valves and Packing.

Shields & Brown, Chicago, Insulated Air Coverings.

L. Schutte & Co., Philadelphia, one Sectional (locomotive) Injector, also one Sectional Induction Condenser.

Trenton Iron Company, Trenton, 12 pieces, showing variation in sizes of Wire Gauges, 24 samples of Wire Rods, mounted.

Blue Prints and Photographs of Machinery.

Allison Manufacturing Company, Philadelphia, 16 Blue Prints of Cars.

Berlin Iron Bridge Company.

Betts Machine Company, Wilmington, one-half dozen Framed Photographs and set of Blue Prints for a No. 2½ Drill.

Beckett & McDowell, Arlington, N. J., 7 Blue Prints of Ore-dressing machinery.

A. Box & Co., Philadelphia, Pa.

Clayton Steam Pump Works, Brooklyn, N. Y.

A. J. Corcoran, New York City.

Cummer Engine Company, Cleveland, Ohio.

Dean Bros., Indianapolis, Ind.

Davidson Steam Pump Company, New York City, two Framed Photographs of Steam Pumps.

E. Dewey & Co., Boston, Mass.

Eugene Diven, '87, L. U., Framed Lithograph.

Easton & Burnham, Pawtucket, R. I.

Fitchburg Machine Works, Massachusetts.

Frick & Co., Waynesboro, Pa.

D. Frisby & Co., Philadelphia, Pa.

J. S. Graham & Co., Rochester, N. Y.

Geiser Manufacturing Company, Waynesboro, Pa.

E. Gould & Eberhardt, Newark, large Framed Collection of 40 Photographs of Machine Tools.

J. Hang, Philadelphia, Blue Print of J. Hang's Valve Gear.

Gordon Maxwell & Co., Hamilton, O.

Edwin Harrington & Son, Philadelphia, one-half dozen Framed Photographs.

Hoopes & Townsend, 10 Framed Photographs of sets of different Forms of Fastenings.

Kensington Engine Works, Philadelphia, a complete set of Blue Prints for 13x24 Buckeye Engine.

Kilbourne Jacobs Manufacturing Company, Columbus, O.

La France Fire Engine Company, Elmira, N. Y.

Lane & Bodley, Cincinnati, O., 16 Blue Prints of 14x16 Engine.

Long & Alstatter Company, Hamilton, O.

J. I. Kinsey, South Easton, Pa.

C. E. Lipe, Syracuse, N. Y.

F. B. Miles (Machine Tool Works) Philadelphia, 12 Blue Prints of Rolling Mill Machinery and Apparatus.

Niles Tool Works, Hamilton, O., Photograph Album of Machine tools.

Tinius Olsen & Co., Philadelphia, Pa.

Pratt & Whitney Company, Hartford, Conn., 54 Blue Prints of Lathes, Planers and Drills.

Pound Manufacturing Company, Lockport, N. Y.

P. H. & F. M. Roots, Connersville, Ind.

Stearns Manufacturing Company, Erie, Pa.

Smith & Sayre Manufacturing Company, New York City.

Thompson & Goss, St. Johnsbury, Vt.

Trenton Iron Company, Trenton, Chart showing Variation of Sizes in Wire Gauges.

H. R. Worthington, New York City, four Framed Photographs.

J. Walker, Philadelphia, Gear Table and Wheel Scale.

W. C. Young & Co., Worcester, Mass.

Catalogues of Machinery.

Edw. P. Allis & Co., Milwaukee, Wis.

John Adt & Son, New Haven, Conn.

American Blowing Forge Co., Lancaster, Pa.

American Lubricating Co., Detroit, Mich.

Ames Manufacturing Co., Chicopee, Mass.

Abendroth & Root, New York City.

Atlas Engine Works, Indianapolis, Ind.

Appleby Bros., London, England.

Armington & Sims, Providence, R. I.
Babcock & Wilcox, Philadelphia, Pa.
Barney & Berry, Springfield, Mass.
Betts Machine Co., Wilmington, Delaware.
Brown & Sharpe Manufacturing Co., Providence, R. I., also Treatise on Milling and Grinding Machinery.
Billings & Spencer, Hartford, Conn., also sheet of Drop Forgings.
New York Belting & Packing Co., New York City.
Beckett & McDowell, Arlington, N. Y.
Bates and Johnson, New York City.
H. Belfield & Co., Philadelphia, Pa.
E. W. Bliss, Brooklyn, N. Y.
Alfred Box & Co., Philadelphia, Pa.
Bradley & Co., Syracuse, N. Y.
Cook & Co., New York City.
Crane Bros. Manufacturing Co., Chicago, Ill.
Colt Fire Arms Co., Hartford, Conn.
Cincinnati Brass Co., Cincinnati, Ohio.
A. F. Cushman, Hartford, Conn.
Cleveland Rolling Mill Co., Cleveland, Ohio.
J. M. Carpenter, Pawtucket, R. I.
Clayton Steam-Pump Works, Clayton, N. Y.
Andrew J. Corcoran, New York City.
Geo. V. Cresson, Philadelphia, Pa.
W. & B. Douglas, Middletown, Conn.
C. H. Delamater & Co., New York City.
Dean Brothers, Indianapolis, Ind.
Detroit Lubricator Co., Detroit, Mich.
Edson Light Co., New York City.
Fitchburg Machine Works, Fitchburg, Mass.
Frick & Co., Waynesboro, Pa.
Farrel Foundry and Machine Co., Waterbury, Conn.
D. Frisby & Co., Philadelphia, Pa.
Ferracute Machine Co., Bridgeton, N. J.
S. C. Forsaith Machine Co., Manchester, N. H.
Ford & Kendig, Philadelphia, Pa.
Getze & Reeves, Philadelphia, Pa.

L. S. Graves & Son, Rochester, N. Y.
Goodell & Garrison, Brooklyn, N. Y.
E. E. Garvin & Co., New York City.
G. B. Grant, Boston, Mass.
Geisir Manufacturing Co., Waynesboro, Pa.
Gordon Maxwell & Co., Hamilton, Ohio.
Holyoke Machine Co., Holyoke, Mass.
Herreshoff Manufacturing Co., Bristol, R. I.
James Hunter & Son, North Adams, Mass.
Hill, Clark & Co., Boston, Mass.
Hartford Machine Screw Co.
Hancock Inspirator Co., Boston, Mass.
A. L. Ide & Son, Springfield, Ill.
Jackson & Tyler, Baltimore, Md.
Junken Brothers, New York City.
Jones & Lamson Machine Co., Windsor, Vt.
Jones & Laughlins, Pittsburgh, Pa., also Report on Cold Rolled Shafting.
Kilbourne Jacobs Manufacturing Co., Columbus, Ohio.
Lambertville Iron Works, Lambertville, N. J.
J. E. Lonergan & Co., Philadelphia, Pa.
Lechner Manufacturing Co., Columbus, Ohio.
La France Fire Engine Co., Elmira, N. Y.
Long & Alstatter, Hamilton, Ohio.
C. E. Lipe, Syracuse, N. Y.
Manning, Maxwill & Moore, New York City.
Murphy's Iron Works, Detroit, Mich.
J. E. Mitchell, Philadelphia, Pa.
Morris County Machine and Iron Co., N. J.
Miller Lock Co., Philadelphia, Pa.
John H. McGowen & Co., Cincinnati, Ohio.
F. B. Miles Machine Tool Works, Philadelphia, Pa.
Norwalk Iron Works, Norwalk, Conn.
National Hydraulic Works, Chester, Pa.
Nason Manufacturing Co., New York City.
Niles Tool Works, Hamilton, Ohio.
James Ostrander & Co., Troy, N. Y.

Ostrander & Co., New York City.
W. R. Ostrander & Co., New York City.
Tinius Olsen & Co., Philadelphia, Pa.
B. W. Payne & Sons, Corning, N. Y.
Powell & Douglass, Waukegan, Ill.
Pedrick & Ayer, Philadelphia, Pa.
Pancoast & Maul, Philadelphia, Pa.
Penfield Block Co.
H. T. Patterson & Co., Philadelphia, Pa.
Pawtucket Manufacturing Co., Pawtucket, R. I.
Poole & Hunt, Baltimore, Md.
Pond Machine Tool Co., Worcester, Mass.
Pound Manufacturing Co., Lockport, N. Y.
Prentise Bros., Worcester, Mass.
Rue Manufacturing Co., Philadelphia, Pa.
John A. Roebling's Sons Co., Trenton, N. J.
P. H. & F. M. Roots, Connersville, Ind.
Russell Wheel & Foundry Co., Detroit, Mich.
Rothweiler Manufacturing Co., Newport, Ky.
Round Drill Co., New York City.
J. F. Rogers & Co., New York City.
Walter Scott, New York City.
Sandy Hill Iron & Brass Works, Sandy Hill, N. Y.
Saebohn & Dieckstall, Sheffield, England.
M. G. Swan, Lancaster, Pa.
Southwark Foundry & Machine Co., Philadelphia, Pa.
S. J. Shimer, Milton, Pa.
Stearns Manufacturing Co., Erie, Pa.
Schleicher, Schumm & Co., Philadelphia, Pa.
Shulz Belting Co., St. Louis, Mo.
Shields & Brown, Chicago, Ill.
Smith & Sayre Manufacturing Co., New York City.
Thacher & Co., Belting, Cleveland, Ohio.
Taunton Crucible Co., Taunton, Mass.
Thomas, Bodgley & Wentworth M'f'g. Co., Milwaukee, Wis.
The Trenton Iron Co., Trenton, N. J.
Irvin Van Wie, Syracuse, N. Y.

Valley Machine Co., Easthampton, Mass.
J. Vin. Renchard, Detroit, Mich.
Walter & McDaniel, Philadelphia, Pa.
Westinghouse, Church, Kerr & Co., New York City.
Jerome Wheelock,, Worcester, Mass.
Watson & Stillman.
Walworth Manufacturing Co., Boston, Mass.
Washburn Machine shop, Worcester, Mass.
Walker Manufacturing Co., Cleveland, Ohio.
Henry Worthington, New York City.
Yale & Town Manufacturing Co., Stamford, Conn., also Treatise on Cranes and Weighing Machinery.
W. C. Young & Co., Worcester, Mass.

TO THE DEPARTMENT OF MINERALOGY AND METALLURGY.

From Dr. J. P. Kimball.

Suite of Blue Prints illustrating Blast Furnace Plant.
Specimens of Pig Iron and Slag.

From Mr. J. M. Hartman.

Blue Prints illustrating Blast Furnace Plant.

From Mr. H. A. Porterfield.

Crystals of Iron.

From The Oxford Copper and Sulphur Smelting Co.

Suite of Copper Ores and Metallurgical Products.

From Mr. R. A. Cooke,

Specimens of Mount Savage Fire Clay.

From Mr. George Jenkins.

Specimens Showing the Effect of the Temperature of Heating on the Fracture of Hardened Steel.

Specimen of Overblown Iron.

From Mr. Cabell Whitehead.

Tin Ore from Virginia.

From Mr. F. F. Amsden.

Tin Ore from the Black Hills.

From Mr. F. L. Clerc.

Suite of Ores and Minerals from Arkansas.

From Mr. E. K. Bachman.

Millerite and Pyrrhotite from the Gap Mine.

From Mr. W. A. Lydon.

Megabasite and Barite.

From Mr. W. R. Pierce.

Crystal of Franklinite.

From Mr. H. W. Frauenthal.

Garnet. Calamine, Hematite, Limonite, etc.

TO THE DEPARTMENT OF MINING AND GEOLOGY.

From Mr. Charles E. Clapp.

Stone Implement.

From the Commission.

Reports of the Pennsylvania Second Geological Survey,

TO THE DEPARTMENT OF CHEMISTRY.

From H. W. Shurts, Orange, N. J.

Boiler Incrustation, Rough and Polished.

From Dr. Ott.

Gall Stones.

From Louis A. Round.

Twelve Colored Drawings of Infusoria, etc.

From Waldron Shapleigh, Yonkers, N. Y.

Collection of Dyed Wools.

From Dr. D. M. Stinson, New York.

Gall Stones.

CONTENTS.

Calendar, 3.
Board of Trustees, 4.
  Honorary Trustees, 4.
  Honorary Alumni Trustees, 5.
  Officers of the Board, 5.
  Executive Committee, 5.
  Library Committee, 6.
  Building Committee, 6.
Faculty, 7.
  President and Professors, 7,
  Lecturers, 8.
  Instructors, 9.
  Gymnasium Service, 10.
  Library " 10.
Catalogue of Students,
  Post Graduate Students, 11.
  Senior Class, 12.
  Junior Class, 13.
  Sophomore Class, 15.
  Freshman Class, 18.
  Advanced Electricity, 22.
  Special Students, 22.
Summaries of Students,
  By Classes, 22.
  By States, 23.
  By Courses, 24.
Origin and Design of the University, 25.
Free Tuition, 25.
Public Worship, 26.
Site, 26.
Buildings,
  Packer Hall, 26
  The Library, 27.
  The Gymnasium, 27.
  The Observatory, 27.
  The New Laboratories, 27.
  Other Buildings, 28.
Expenses of Students, 29.
Admission of Students,
  Entrance Examinations, 30.
  Dates of Examinations, 30.
  Character of Examinations, 30.
  Requirements for Admission, 30.
  Conditional Admission, 32.
  Special Students, 32.
  Admission to Advanced Classes, 33.
  Admission to Graduate Courses, 33.
Programme of Studies:
  THE SCHOOL OF GENERAL LITERATURE, 34.
    The Classical Course, 34.
    The Latin-Scientific Course, 37.
    The Course in Science and Letters, 41.
  THE SCHOOL OF TECHNOLOGY, 44.
    The Course in Civil Engineering, 45.
    The Course in Mechanical Engineering, 49.
    The Course in Mining and Metallurgy, 54.
    The Course in Analytical Chemistry, 59.
    The Advanced Course in Electricity, 64.
Physical Culture, 67.
Graduating Theses, 67.
Diplomas and Certificates, 68.
Graduate Students, 68.
Post Graduate Degrees:
  Requirements for M.A., 68.
  Requirements for M.S., 68.
  Requirements for Ph.D., 69.
The University Library, 69.
  Regulations, 70.
The Observatory, 70.
Students' Societies, 71.
Founder's Day, 72.
Washington's Birthday, 72.
The University Sermon, 72.
Theses of the Class of 1885, 72.
The Address before the Alumni, 74.
University Day, 74.
  Exercises of June, 1885, 75.
  Award of Wilbur Scholarship, 75.
  Degrees Conferred, 76.
The Wilbur Scholarship, 76.
The Alumni Scholarship, 76.
The Alumni Prizes in Oratory, 77.
Examination Papers, 78.
List of Alumni, 89.
Officers of Alumni Association, 98.
List of Donations, 99.

The Register is sent to all graduates who furnish their addresses for the purpose, and to all other persons on application to

THE PRESIDENT OF LEHIGH UNIVERSITY,
South Bethlehem, Pa.